Technology in Action

Marshall Space Flight Center
Technology Utilization Office

1992 Annual Report

National Aeronautics and
Space Administration

Marshall Space Flight Center
Huntsville, AL 35812

Foreword

The NASA Administrator, Daniel S. Goldin, has underscored the seriousness of the economic challenges facing the United States and reiterated the White House's National Technology Initiative. "Everything that most Americans hold dear: our quality of life, the environment, national security, foreign policy aims, all hinge upon the restoration of our competitive standing in the global economy. A treasure house of scientific and engineering knowledge resides in our country that, if transferred faster and better to the public and private sectors, can be a major contributor to the creation of a new era in world leadership."

I believe that the broad range of MSFC employees' expertise will enable them to respond positively to the NASA Administrator's desire that technology transfer be ranked as a fundamental mission of the Agency. MSFC has long recognized the need to enhance the flow of Federally-derived technologies to the Nation's entrepreneurs—to those going toe-to-toe with the world's economic powers. We are proud of the reputation of responsiveness we have established to date and look forward to doing even more in the future, expanding our efforts into even more states in the MSFC region.

It is important that we work as a team to get U.S. space-derived technologies into the hands of American industry so as to make our Nation the undisputed leader in the global marketplace.

In this *1992 Annual Report*, I believe you will find an active, vibrant program already under way to bring the benefits of the space program down to Earth to benefit American businesses, industries, academic institutions, and individuals. If we can assist you with our technology transfer programs, please let us know.

T. J. Lee
Director

Table of Contents

Introduction

In keeping with the NASA Administrator's announcement that technology transfer will become a fundamental mission of NASA, the Marshall Space Flight Center (MSFC) has initiated new programs to reach the heartland of U.S. industry. The Center has continued to expand its already well-established outreach program aimed at helping American business, industry, and academia at the grassroots level. The goal is to ensure that America regains and maintains its proper place of leadership among the world's technologically developed nations.

MSFC's national goal is to enhance America's competitiveness in the world marketplace, fortify the value of the dollar, and ensure technological breakthroughs by American laboratories benefit taxpayers and industries.

The Technology Utilization (TU) Office at MSFC believes a number of measures are possible to slow, then halt, and ultimately reverse the erosion of American technological leadership. MSFC's TU Office is reaching out to American industry on an increasingly broadening scope, facilitating the transfer of NASA-derived technologies to American businesses, industries, educational institutions, and individuals.

There are many valid approaches to achieving this goal. Some, such as the National Technology Initiative, begin at the top and work down through America's top corporate structure. Others, such as the technology transfer program that MSFC has implemented, begin at the one-on-one, grassroots level—working with small and medium-sized firms that form the bulk of American industry. What can be done by one NASA center is, admittedly, limited. But by extrapolating this one-on-one approach to the more than 700 Federal laboratories, a great deal can be accomplished.

This report contains an examination of outreach and inreach programs, problem statements programs, applications projects, new technology reporting, new technology administration, and the need for increased resources to further facilitate technology transfer.

Unique Aspects of MSFC's Technology Utilization and Transfer Program

- Memorandums of Understanding for the transfer of technology with the governors of six states.
- A Technology Applications Board (TAB) to evaluate and process problem statements submitted by the private sector.
- New and innovative means to publicize selected problem statements and to draw attention to successful problem resolutions.
- Innovative discretionary projects adapting MSFC-supported technology to industrial, academic, and humanitarian needs.

Outreach Programs

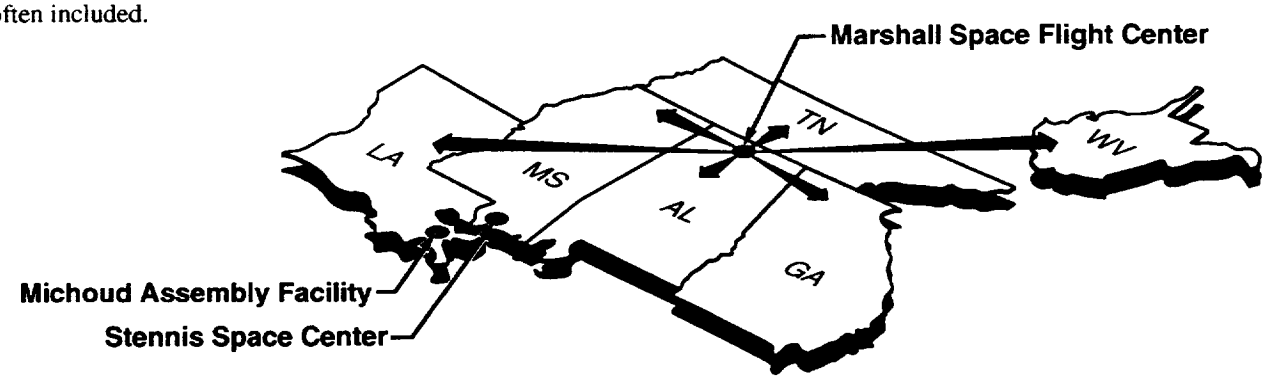
Outreach is one of the most effective areas of MSFC's technology transfer program. Uniquely designed to reach small industry, the outreach effort has spread the word about NASA technology transfer throughout nearby states and has resulted in dozens of examples of assistance to industry.

The MSFC outreach program involves all facets of state government including economic development, legislative, chamber of commerce, small business assistance, and others. The program also works closely with industrial and academic institutions, such as power and communications companies and university research institutions. In addition, congressional offices are often included.

Memorandums of Understanding

MSFC, by nature of its geographical location, is principally oriented toward the Southeastern U.S., but is active in both national NASA-derived technology transfer programs and operations of the Federal Laboratory Consortium, as well. Working either on its own or in conjunction with other NASA field centers, MSFC has initiated Memorandums of Understanding (MOU) with Alabama, Tennessee, Mississippi, Louisiana, West Virginia, and Georgia.

Through these Memorandums of Understanding, MSFC and the various states have sponsored workshops and symposiums aimed at increasing regional awareness of the benefits and potential applications of space-related research at MSFC. These agreements pledge MSFC to give special attention to technical problems posed by the private sector within each state, provided those problems fall within the various disciplines represented within NASA.



The geographical area for which MSFC has established Memorandums of Understanding regarding the transfer of NASA-derived technology includes most of the Southeastern United States and the state of West Virginia.

Representatives of MSFC and Tennessee gather to discuss joint technology transfer endeavors.

The MSFC Technology Utilization Office maintains liaison with local economic development groups and has assigned one person to each state. The Center has hosted 16 delegations from various states who wanted to see NASA scientists and engineers at work. TU representatives have made more than 100 visits to industries, have had numerous speaking engagements with business groups, staffed technology transfer exhibits, conducted seminars and workshops, and met with Congressional staff members. The Technology Utilization Office's staff has participated in these activities to see for itself ways in which NASA-derived and/or NASA contractor-derived technologies could be used most effectively, or to assess needs in order to better explain problem areas to the engineers and scientists at MSFC who possess the skills to resolve them.

Each MOU calls for an annual report outlining developments and looking ahead to the coming year. These reports link the MSFC Director and the governors of the six states.

Briefings to Civic and Economic Development Groups

The MSFC Technology Utilization Office has assigned to each state a specific individual responsible for coordinating all outreach activities within the state. A key part of this outreach is cooperation with various groups in each state who are charged with promoting economic growth, attracting new industry, or retaining existing businesses.

In 1992, the MSFC Technology Utilization Office participated in over 70 meetings and seminars in the six states. The potential competitive advantages of adopting available NASA technology and ways of assessing technical information were described. These meetings have resulted in a new consciousness of the advantages of technology and of the contribution of NASA and MSFC to the region. Also promoted at these sessions has been the National Technology Initiative, informing the attendees of the technology assistance available throughout the Federal laboratory system.

Industry Visits by Volunteers

The most effective method to reach industries has been the training of volunteers to canvass all the industries located in a specific area, usually a county. Chambers of commerce representatives and other persons interested in the economic health of an area assist in these activities by hosting kick-off luncheons and workshops in which MSFC technology transfer representatives brief volunteer workers. State economic and community development officials and district congressional representatives usually participate and lend support.

Following these workshops, MSFC technology transfer experts often accompany the volunteers on a trial industry plant visit. The volunteers later complete the canvass and forward the problem statements and technical inquiries to MSFC. This method, first initiated in Warren County, Tennessee, has proven to be extremely effective. It results in the most problem statements and the most industry assistance.

Activities in the six states fall into four broad categories:

- Briefings to civic and economic development groups
- Industry visits by volunteers
- Other visits to industries
- Visits to Marshall Space Flight Center.

Other Visits to Industries

Often, as a result of outreach to an area, MSFC technology transfer specialists are invited to address problems being encountered by a specific plant or industry. If these problems appear to have wide significance, fall within an MSFC area of expertise, and are not solvable using commercially available technology, the Technology Utilization Office arranges for a plant visit by appropriate engineering personnel.

During these visits, plant engineers describe their problems face-to-face with government experts and frequently receive on-the-spot recommendations. At other times, the issues discussed are brought back to the Center for wider discussion with other engineers and scientists from various disciplines.

Successful technology transfer activities are increasing exponentially at MSFC, particularly as word spreads among industries that help is available from the federal sector either at no cost or on a reimbursable basis.

This kind of assistance pays dividends in the short term by resolving an immediate problem area, and in the long term by improving the individual firm's competitiveness in the global market. Marshall has received ever-increasing numbers of problem statements from firms seeking to tap into NASA's expertise and technological experience. From a start of 28 requests for assistance in 1989, 1990 saw an increase to 111. By 1991, it grew to 170 written requests for aid. In 1992, the total advanced to 339 requests from American businesses, academic institutions, and individuals. A large percentage of the firms assisted are highly satisfied and have expressed their appreciation in numerous letters to the MSFC Director and to the Director of Technology Utilization.

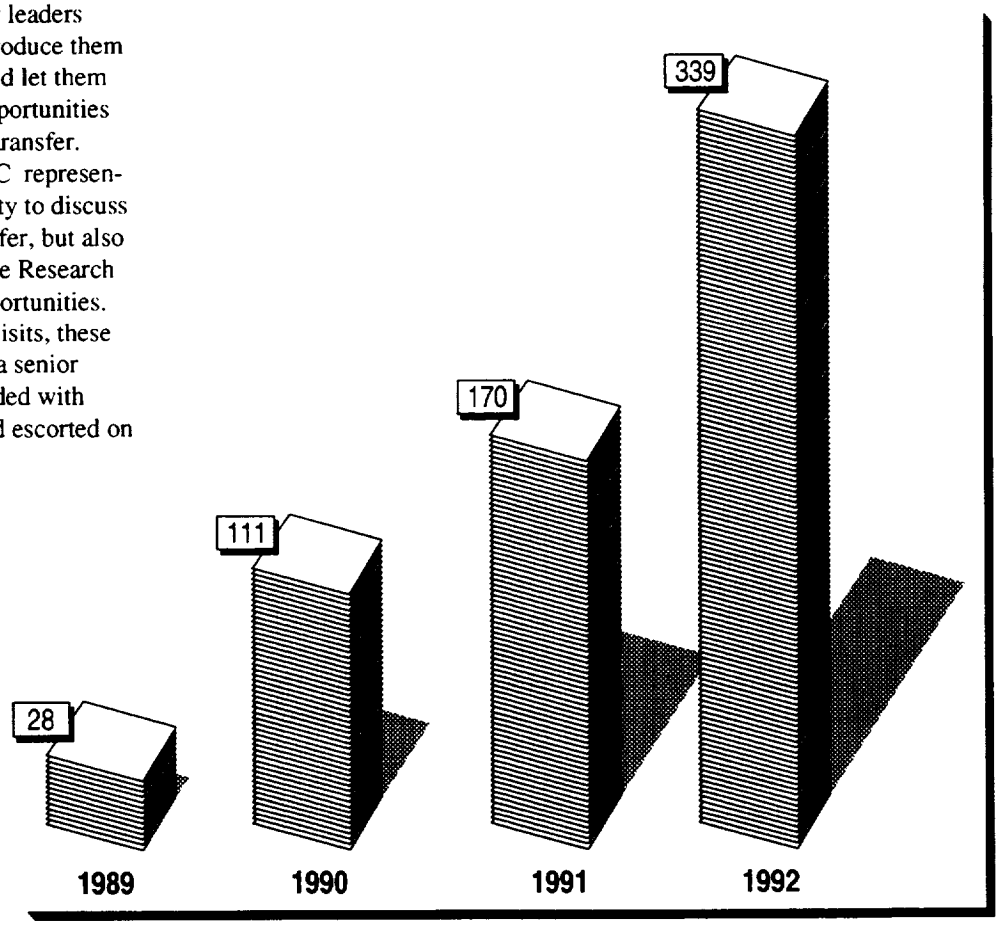
Technology Utilization representatives meet with representatives from Alabama, Tennessee, and West Virginia economic development councils.

Visits to Marshall Space Flight Center

Economic development workers in each state might be thought of as the "retailers" of technology transfer, with NASA/Marshall as the "wholesaler." These retailers are the agents who deal most directly with businesses and industries in their communities, and who are best able to find opportunities for technology transfer. However, if they are to recommend adoption of NASA technologies, they must first be made aware of what techolnogies are available.

The Jackson County, Alabama, Industrial Development Board meets with TU Director Ismail Akbay and members of the TU Office staff.

In 1992, the Center continued to bring in economic development officials and business and industry leaders from various states to introduce them to ongoing capabilities and let them see for themselves the opportunities that exist for technology transfer. During these visits, MSFC representatives take the opportunity to discuss not only technology transfer, but also Small Business Innovative Research and other contracting opportunities. As with previous years' visits, these groups are welcomed by a senior manager at MSFC, provided with informative briefings, and escorted on a tour of MSFC facilities.



Growth of technical inquiries submitted to MSFC since the first MOU was signed in 1989.

Technology Transfer Activities

Number and Type of Space Act Agreements

MSFC supported 24 Space Act Agreements in 1992. A 25th agreement is being processed.

The Program Development Directorate has had three Technical Exchange Agreements which can be considered as Space Act Agreements. The first was with Logicon Control Dynamics to perform developmental testing on a guidance, navigation, and control module. The second was with Teledyne Brown to perform flight testing in a KC–135 of advanced measurement/attenuant residual acceleration in a microgravity environment. And the third was with a firm called Rantec to perform joint work on biological-technological applications in microgravity.

Cooperation With Other Technology Transfer Professionals

MSFC's outreach activity also has been directed toward technology transfer professionals. During 1991, a chapter of the Technology Transfer Society was established, with MSFC's Director of Technology Utilization, Ismail Akbay, being elected its first president. The Huntsville chapter joined the Huntsville Association of Technical Societies on October 22, 1992.

The August 27, 1992, meeting of the Federal Laboratory Consortium's Southeast Region was held at MSFC.

MSFC TU Director Ismail Akbay discusses a Space Act Agreement with representatives from USBI in Huntsville.

The Science and Engineering Directorate has worked on Space Act Agreement projects with:

- General Dynamics Space Systems—Propulsion module testing and aluminum-lithium welding.
- McDonnell-Douglas—Neutral Buoyancy Simulator.
- Pratt and Whitney—For materials research tasks, a high-pressure fuel pump test in the Technology Test Bed, and computed tomography for nondestructive analysis of space shuttle main engine castings.
- Rocketdyne—Research on liquid oxygen hydrostatic bearing turbopump.
- Rockwell Space Systems—Propulsion module testing.
- Thiokol—Research on hybrid propulsion using solid fuel and a liquid oxidizer, and plasma torch testing of nozzle material performed in the Productivity Enhancement Complex.
- TRW—Proximity operations in the flat floor facility and a study of benefits from the application of technologies developed under cooperative Marshall Center-industry agreements, which include reduced life-cycle costs through faster design, improved production, enhanced operations, and reduced weight, as well as safer operation and reduced environmental impact.

The remaining six consist of the Memorandums of Understanding with the governors and their state economic development councils in Alabama, Mississippi, Louisiana, Georgia, Tennessee, and West Virginia. A new agreement is being developed between MSFC's Productivity Enhancement Facility's Metals Processes Branch and USBI, which is seeking a plasma coating to reduce wear on a pump's crankshaft.

Technology Transfer Through Industry Licenses Granted for Patents

No licenses were granted in 1992, but several are under negotiation. As a result, no royalties have been received. Approximately $1,100 in royalties will be disbursed from licenses granted prior to 1992.

NASA Patents Granted

During 1992, MSFC submitted 19 patent applications. Thirteen have been issued and six are pending.

Documented Industry Use of NASA Technology

Letters from various industries, etc., are found in the addendum to this report.

Boeing's Partnership in Technology Transfer Initiatives

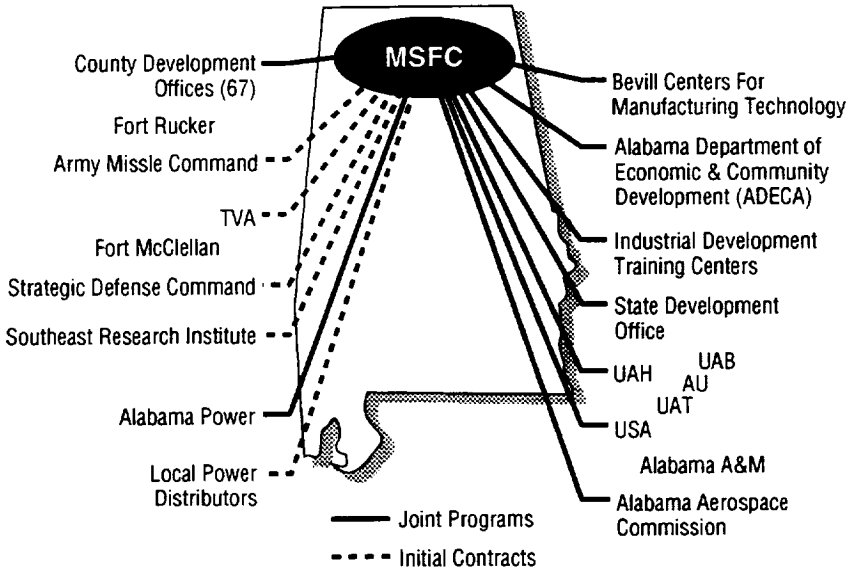
In January 1992, Boeing Defense and Space Group, Missiles and Space Division in Huntsville, met with representatives of the Technology Utilization Office to discuss Boeing's support of MSFC technology transfer initiatives. As a result, Boeing has appointed a representative to the MSFC Technology Applications Board and has assigned Mr. Darrell Cox as Boeing Huntsville's new technology manager. He is charged with ensuring that new technologies are reported in accordance with standard NASA requirements, reviewing new technologies (in particular, independent research and development efforts) and published technology developments, supporting the Technology Applications Board, and documenting Boeing's Space Station *Freedom* program contributions to technology transfer. Boeing also has suggested the inclusion of contractors in the standard NASA disclaimer statement.

Huntsville Chamber of Commerce Initiative

The local Huntsville Chamber of Commerce has launched a technology outreach initiative modeled after that of MSFC, which includes all local federal agencies. Under this initiative, representatives from local federal agencies and industries visit companies to identify opportunities for technology transfer. Resulting problems are reviewed by the Technology Applications Board for assignment to an agency or referral to the Federal Laboratory Consortium, the National Technology Transfer Center, a Regional Technology Transfer Center, or a company for resolution.

Participation in Technology 2002

The Marshall Space Flight Center's Technology Utilization Office operated an exhibit booth at the Technology 2002 Exposition, December 1–3, 1992, in Baltimore, Maryland. Staffing personnel were provided for the full 3-day event which drew several thousand individuals from business, industry, and academia. Meetings were conducted between technical presenters from MSFC, interested private sector researchers, and television media representatives covering the event. Marshall Center participation in this event generated a great deal of good will, produced a useful list of future contacts, and disseminated valuable information on the technology utilization, transfer, and applications programs managed by NASA and its field centers.



MSFC Technology Transfer Affiliates in Alabama.

Outreach Accomplishments

On a state-by-state basis, some of the more important activities of Marshall Space Flight Center are given below.

West Virginia Senator Robert C. Byrd and MSFC TU Director Ismail Akbay discuss ways in which NASA can transfer technologies to West Virginia industries.

West Virginia

- Provision of usable recommendations for a quick-drying, ultraviolet resistant, plastic substrate-compatible ink for use by the nursery industry.

MSFC Assistant Director for Policy and Review Susan Cloud meets with Director of Economic Development for Georgia Dr. Donald Grace.

Tennessee

- MSFC analysis led to corrective action being recommended for an electric motor manufacturer experiencing limited life cycles on governor springs.
- MSFC clean room and instrumentation expertise helped a Tennessee distillery control dust contamination and improve manufacturing processes.
- MSFC structural modeling techniques are helping a flat-bed trailer manufacturer exploring the use of strong, lighter-weight composites.
- A manufacturer of institutional food delivery carts improved thermal separation between hot and cold compartments by adopting spray-on foam insulation developed originally for the space shuttle's external tank.

Alabama

- With MSFC providing testing assistance, the owner of a small business in Tallahassee was able to convince commercial aircraft manufacturers to use its composite ducts.
- MSFC scientists assisted a yarn mill in identifying the composition of an unacceptable contaminant.
- MSFC is helping a windscreen manufacturer determine the source of a major problem with laminate adhesion.

Alabama industrialists visit MSFC.

Georgia

- A Space Act Agreement is being considered to design and build composite parts for carpet machinery in cooperation with a major carpet manufacturer.
- A builder of mobile home steel doors has benefited from NASA expertise in the use of protective coatings.
- MSFC recommended methods of separating lead and lead sulfate as hazardous waste from a process involving recycled automobile battery cases for MA Industries in Peachtree City.

Mississippi

- MSFC worked with other NASA centers to provide information and assistance to Delta Systems Integration and Engineering in Clarksdale, a small firm which designs and manufactures cable and wire harness assemblies.
- MSFC provided thermal comfort criteria to the Sunbeam Home Comfort Company in Meridian, which is a major manufacturer of electric blankets.

Louisiana

- MSFC is helping Copes, Inc., a maker of composite prosthetic ankles, perform detailed structural analyses.

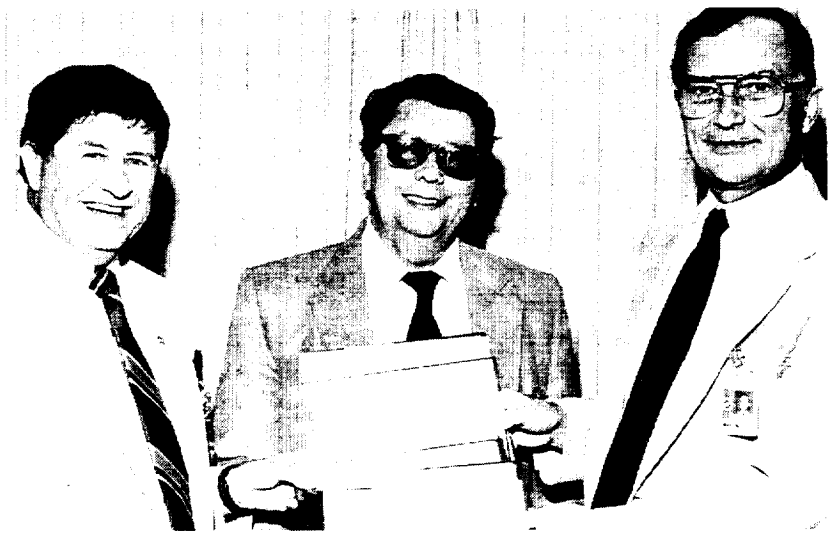
Inreach Programs

Inreach programs, directed toward the MSFC work force, are two-fold. First, they are intended to make employees—civil service and contractor—aware of the ongoing transfer of NASA-derived and NASA contractor-derived technologies to various states' industries, businesses, academic institutions, and individuals. Inreach is also geared toward enhancing civil service and contractor employee participation in MSFC's technology transfer program. Both aspects continued to gather momentum in 1992.

Awards and Accomplishments

In 1992, ceremonies were conducted at which 40 awards were presented to federal employees and 86 awards to contractors, for a total of 126 Space Act Tech Brief Awards.

One of the MSFC's major award recipients in 1992 was TU Director Ismail Akbay. As president of the Huntsville Technology Transfer Society chapter, he accepted the society's Barbara Ostermeier Award, presented annually to the most outstanding chapter. Later, at the Federal Laboratory Consortium's gathering in Scottsdale, Arizona, Mr. Akbay was named Representative of the Year. In December 1992, he was presented with a lifetime achievement award by the American Technology Utilization Foundation.



Ismail Akbay and Dr. George McDonough present Space Act Awards to NASA Inventor of the Year Richard Hoover.

Employee Education Increases Participation

Through inreach programs, individuals from appropriate disciplines are solicited to participate when problems arise suitable to their areas of expertise. The technology transfer program is a topic of new employee orientations. Employee job descriptions contain an element related to the support of technology transfer efforts. Supervisory briefings are conducted to impart the importance of technology transfer activities to middle management and MSFC's executive staff. Support from management at all levels at MSFC has been outstanding and highly beneficial to the overall success of inreach activities.

Because of the Technology Utilization Office's persistence, MSFC has become the first Federal laboratory to include technology transfer statements in the job descriptions of engineers and scientists employed at MSFC. Although called for in the 1986 Technology Transfer Act, this innovation typically has encountered considerable resistance from management and employee organizations. The addition, however, once in effect, has resulted in a significant increase in employee participation in the technology transfer process. Engineers and scientists at Marshall are more willing to apply their findings to the benefit of the private sector and have their skills and expertise recognized more broadly.

Problem Statements Program

The MSFC Technology Utilization Office is continually seeking better approaches to tackling problems from industry. The problem statements program continues to be a means by which those in need can access the expertise at Marshall Space Flight Center.

Technology Applications Board

In 1990, the MSFC Technology Utilization Office took a highly innovative step by establishing a Technology Applications Board to ensure that all technical inquiries directed to MSFC receive prompt and thoughtful attention. The board chair assigns a member to act as lead for each inquiry and recommends an initial course of action. Each week, the panel evaluates all unresolved requests and, if there is an inordinate delay or difficulty in getting a response, other board members can suggest alternative approaches for responding to the inquiry.

The MSFC Technology Utilization Office is pleased that of the 339 inquiries logged in calendar year 1992, it was able to provide responses or referrals to other experts 91 percent of the time. Responses ranged from specific suggestions for reducing particulate influx into distilled beverages at a plant in Lynchburg, Tennessee, to the applicability of man-made composites to the construction of a human-powered submarine at Texas A&M University. Typical of the inquiries referred to other organizations was a request for assistance in designing orthodontic braces and other composite material devices, such as crutches and cots for Boy Scouts with disabilities, in Washington, DC. The U.S. Army Materials Development Lab at Waterville, Massachusetts, and the Sparta Company of San Diego, California, were able to provide a positive response.

The MSFC Technology Utilization Office is the only point of contact available to many enterprises, and the office's value as a clearinghouse/ referral point is well established. The goal in 1992 was to provide the maximum assistance possible concurrent with budgetary and personal limitations. This has been accomplished.

Idea Corner

Initiated earlier, this program to disseminate problem statements through MSFC's weekly paper, the Marshall Star, has continued to be very successful. Brief summaries of problem statements are published and readers are invited to submit ideas, either in writing or by phone. The Marshall Star has a circulation of 8,000, including retirees and select aerospace industry personnel, thus innovative problem-solving suggestions are often received from unexpected quarters. The overall response Center-wide to these articles continues to be highly positive.

The Technology Counselor

The Southeast Technology Applications Center (STAC) technology counselor works with the MSFC Technology Utilization Office in a cooperative effort to consider the needs of clients in the Southeast. The technology counselor is proficient in identifying technical expertise and assists in those matters the Technology Utilization Office is considering.

Applications Projects

During 1992, the MSFC Technology Utilization Office managed six ongoing technology applications projects, six innovative discretionary projects, and two proposed new starts.

Ongoing Projects

Emergency Vehicle Alert System for the Hearing Impaired

Currently, there are millions of hearing-impaired drivers who need a means to detect an approaching emergency vehicle. Over the years, this has caused serious accidents resulting in many injuries and loss of life. This project involves development of a limited-range transmitter to be mounted on the emergency vehicle and a small receiver in the handicapped individual's automobile. The transmitter would send a digital word containing vehicle identification, direction of travel, and location. The receiver unit will decode this information and display it for the driver.

At the present time, a prototype antenna has been constructed and preliminary tests have been run. The antenna has directional information, but further research is needed. Digital processing and modified transmission techniques will enhance system performance. In the next phase, the antenna will be tested in a open field, around large buildings, in traffic with large trucks, and in parking lots with many vehicles. The results of these tests will be used to modify the antenna design to achieve optimum performance.

Below-the-Elbow Prostheses and Flexible End-Effectors for Amputees

James Carden, a retired MSFC engineer who lost his left hand in a home shop accident, and Amie Bradley, a Wal-Mart employee who lost her left hand in an auto accident, have continued to work with MSFC's Biomedical Applications Team through the Technology Utilization Office. The development of flexible end-effectors, or attachments, for prosthetic devices are a direct result of MSFC's work in flexible manufacturing and advanced automation.

In October 1992, the team and Carden were called upon to help Caitlin Roberts, 16, of Shaker Heights, Ohio, who was born without a lower left arm. The teenager visited MSFC, was fitted with a socket similar to that

John Richardson of the TU Office assists Caitlin Roberts.

used by Carden and Bradley, and presented with a range of clip-on/off devices that will allow her to pursue a career as a portrait artist, sculptor, and photographer when she graduates from high school in 1993. The devices include a clamp with which to hold an artist's palette and sculpting tools, and personal grooming devices such as a hair curler holder.

Roberts was met on her return to the Cleveland area by news teams from all five Cleveland television stations and by a photojournalist from the Cleveland Plain Dealer, a major midwestern newspaper with a circulation of more than one million.

It is estimated that at least two million people saw or read of MSFC's work in biomedical applications.

Continued development of the devices is planned. During the past year, the MSFC team, voluntarily assisted by a Huntsville certified orthotist-prosthetist, has developed new models, has met with the two local amputees monthly to assess their progress and solicit suggestions, and has assisted in the completion of a video news release with a team from NASA Headquarters. Design has started for an orthotic device—a self-locking knee brace for individuals with osteoporosis. During the coming quarter, development will continue on a chain saw holder, a hoe and rake holder, a wheelbarrow handle holder, and a walker-gripping device.

An Expert Weld Inspection System for Quality Control

Welding is the most widely used metal joining process today, and the inspection of welding operations is critical to ensure quality and safety of end items ranging from school buses to aircraft. Inspection of weldments is largely performed by visual inspection by highly trained individuals.

WELDSMART, a vision-based system for weld quality inspection, combines an image processing system with an expert system interface. When completed, WELDSMART may be used both as a tool for the actual inspection of welds and as a training system for human inspectors. During the past year, the MSFC Technology Utilization Office has participated in completing most of the contract work and has helped develop a five-step visual inspection process. The final quarter of 1991 was spent fine-tuning the developed software and preparing it for final tests. This applies specifically to neural network development. The contract work has been completed on the project and pilot programs are planned to implement this technology on MSFC applications.

Flexible Agricultural Robotic Manipulator System

The Marshall Space Flight Center has been working with Dr. Ward Simonton, University of Georgia Experiment Station in Griffin, Georgia, in the development of a Flexible Agricultural Robotic Manipulator System (FARMS), for processing live plant material. MSFC has supplied technical expertise to manufacture the end-effector and gripper for this system, which robotically cuts and places live plants in plastic trays for the greenhouse industry. The FARMS project has completed the second and third objectives as agreed upon in September 1991. The work has begun to model current robotic workcells to establish a baseline performance level.

Development of ROBOSIM for Academic and Industrial Use

ROBOSIM is a graphics-based simulator for the development of robotic systems. It has been used as a cost-effective method of rapidly designing robotics and automation prototypes, as well as space systems planning. ROBOSIM was initially developed at MSFC to provide a low-cost method of rapidly studying concepts in robotics and automation by combining more traditional computer simulation techniques with real-time graphic animation. These systems were used to study a broad spectrum of robotic applications, from industrial robotics for manufacturing to robots used in on-orbit operations. ROBOSIM was developed for use on MSFC's large scale computer and graphics systems. The project has resulted in the adaptation of ROBOSIM for use on more commonly available workstations and personal computers as a precursor to release outside of NASA.

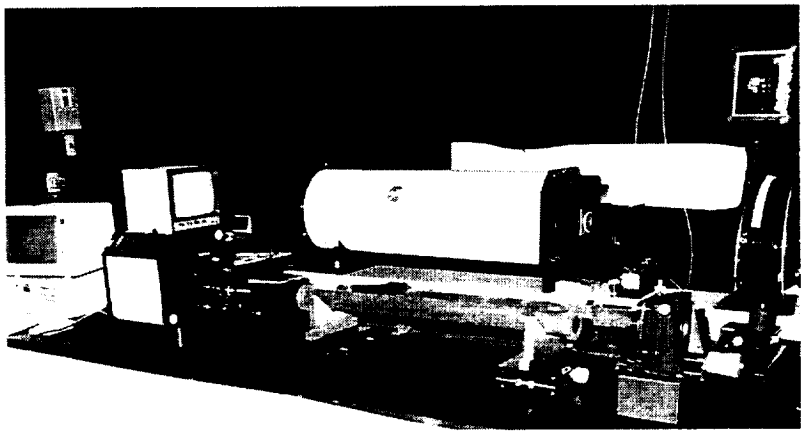
Because of the critical need for engineers and technologists with training in automation and robotics to ensure our nation's competitiveness in the global marketplace, plans exist for the distribution of ROBOSIM to hundreds of colleges and universities with engineering curricula. When used by a school, ROBOSIM will allow students to experiment with a wide range of robotic systems or create their own. Although it is not a total substitute for a hardware laboratory, it can greatly augment a school's robotics program.

Water Window Imaging X-Ray Microscope

An MSFC astrophysicist, Richard Hoover, is developing a new type of microscope based on theSkylab telescope technology that gave an unprecedented look at the Sun in the early 1970's. This invention—the Water Window Imaging X-Ray Microscope—could have a profound impact on cell biology and genetic engineering; it could revolutionize the search for the human genetic code and lead to cures for currently incurable diseases, such as cancer and AIDS.

This new microscope uses x rays instead of visible light to create ultrahigh resolution, high-contrast images. The microscope got its "water window" name because it is designed to operate in a narrow band of the x-ray spectrum where water is relatively transparent and carbon is highly absorptive. Operating within that wavelength regime, the Water Window Imaging X-Ray Microscope may make it possible to investigate carbon structures, and possibly even note their motions, within the aqueous environment of living cells.

It may allow scientists to study cells while they are alive—to get actual images of DNA molecules, etc.—whereas such research is currently based on indirect techniques. Such a development has enormous implications for medical researchers; it would permit, for example, direct study of malignant tumors, design of advanced drugs, and study of genetic mutations that cause birth defects.



The Water Window Imaging X-Ray Microscope.

Innovative Discretionary Projects

Seat Lift System

An MSFC team has developed a lightweight, portable, powered seat lift useful to people with severe degenerative conditions in their knees, hips, or back. It will benefit those people who are unable to get up from the seated position without help. Millions of people with varying degrees of disabilities may benefit from this device, which would be useful in homes, hospitals, and nursing homes. Despite its small size, the lightweight seat opens to lift a person up to 300 pounds to a nearly standing position. The seat remains rigid when the motor is turned off so that the user is supported at all times during the lift, even if they stop and change directions. The design is being considered for production.

Platform Stair Lift System

The platform stair lift system provides easy access for anyone having trouble climbing stairs, indoors or out. The system, cost-effective for both home and industrial use, was designed by a team at MSFC. The design is a flat platform that can accommodate a wheelchair, standing passengers, and those with baby carriages or hand trucks. These features do not present an obstacle to normal use of the stairs in its "rest" position. A prototype of the platform stair lift system is expected to be available in 1993.

Wheelchair suspension team designers Bruce Weddendorf and Pedro Rodriguez

Food Cart Insulation

In 1990, United Service Equipment Company of Murfreesboro, Tennessee, requested help to investigate thermal protection material for a curtain separating the hot and cold sides of a food cart they manufacture. They wanted to maintain 140–175 °F and 34–40 °F on separate sides for 8 hours. The problem was given to Martin Marietta Manned Space Systems at Michoud Assembly Facility, prime contractor for the space shuttle external tank and well-versed in the thermal characteristics and processing of foams. A thermal curtain prototype was fabricated and displayed at Technology 2000 in Washington, DC, in December 1990. Martin Marietta is transferring the intellectual rights to the company, which plans to produce the new cart.

Improved Wheelchair Suspension

The preliminary design review has been completed for a new flex-rim wheel design to provide a softer, safer ride for wheelchairs over rough and uneven terrain. Eagle Sportschairs in Snellville, Georgia, has loaned one of their wheelchairs to an MSFC structures engineer who is designing the new suspension system. Representatives of MSFC's Structures and Dynamics Laboratory, a representative of the Research Triangle Institute in North Carolina, and Doug Kennedy, a wheelchair racer from Haleyville, Alabama, participated in a meeting that was chaired by a member of the Technology Utilization Office who serves as project manager for this effort.

Copes Bionic Ankle

MSFC conducted a stress analysis on a one-piece composite design bionic ankle for the Copes Foundation of Baton Rouge, Louisiana, using MSFC's computational analysis facilities. The designer hopes to improve on an existing prosthetic ankle of titanium with ball joint and spring for natural motion. The new composite design may be lighter, more functional and durable, and allow an even better range of natural motions.

Flow-Through Immunoaffinity Filter

Although no funds were received in 1992 to continue this project, the project engineer is continuing work to determine the feasibility of, and to design, fabricate, and test a flow-through device that will take advantage of immunological specificity to remove particular cell populations or sub-populations from blood. Initial funding was received in November 1991. A scope of work has been defined and funding was transferred to the University of Alabama in Huntsville under an umbrella contract with the school's Department of Chemistry.

Proposed New Starts

Personal Computer Workstation Interface for the Blind

Current methods that have been developed to allow the blind to interact with computer systems have been limited to the use of speech synthesizers that mimic text prompts and Braille computer keyboards. Although these technologies have allowed limited use of computers by the blind, they have been limited to command-line-oriented operating systems. Most current computer systems use a windows-oriented operating system for computer/user interactions and have proven extremely difficult for the visually impaired to use. To solve this problem, an MSFC engineer, who is himself visually impaired, has developed a new technique for the blind to interact with computers. It is analogous to the windows environment, but uses stereo sound and psycho-acoustic "images" to present the user with a pathway through computer operations that can be readily adopted by the blind.

Advanced Underwater Location Devices

Spread-spectrum signal processing has long been in use for satellite communication, with the Global Positioning System (GPS) as a prominent example. A feature of this type of signal processing is the ability to detect very low-level signal sources. The Advanced Underwater Location Device (AULD) project will adapt this technology to a system of underwater acoustic beacons and receivers. MSFC is performing this research in conjunction with Sandia Research Associates, Inc., of Albuquerque, New Mexico. When fully implemented, this new technology will result in underwater locating devices that will extend the range and accuracy of conventional systems now in use by NASA, government, and industry for salvage and underwater resources and rescue operations.

Publicizing Technology Transfer

Two innovative approaches to reaching the American public at the grassroots level and gaining public support for NASA, were established in 1991 and continued to mature in 1992.

Technical Publication Support

The Technology Utilization Office established a position for a technical writer-editor, with a specialty in the physical sciences, who monitors the office's ongoing technology assistance program and develops feature-length magazine articles, both for trade journals and the popular press. The writer works closely with the MSFC Public Affairs Office. The program, entering its second year, has resulted in articles being submitted to more than a dozen publications.

Spacelink Data Base

The office continues to update the Spacelink computer data base that contains abstracts of all articles published in the annual *Spinoff* magazine. In addition, the Spacelink network has abstracts of applications engineering projects and lists of technology transfer agents and services. It also includes information on patent counsels throughout NASA. The Spacelink service, which MSFC manages for NASA, is a free service. On an average, 20,000 callers access the system each month.

New Technology Reporting

To identify and disseminate innovative technologies developed by Center engineers or by companies under contract to NASA, the TU Office places great emphasis on the New Technology Reporting System. MSFC in-house and contractor employees continue to make significant contributions, continuing the trend of the past several years.

NASA *Tech Briefs*

During the first three quarters of 1992, the Technology Utilization Office at MSFC received 276 contractor-reportable items and 43 civil service-derived reportable items. This represents a 33 percent increase over the first three quarters of 1991. The TU Office made128 submissions to NASA *Tech Briefs*. At the end of the first 9 months of 1992, the office had a backlog of 90 tech briefs awaiting publication.

Technical Support Packages

More than 12,000 requests for technical support packages were received through September 1992. From 1983–91, MSFC was the second leading field center in tech briefs published, with an average of 127, and second in dissemination of technical support packages, with an annual average above 13,000.

Conclusion

Technology transfer challenges and achievements by MSFC employees characterized 1992. Many important projects were successfully completed and many promising new projects started.

The future of technology transfer at MSFC looks bright, particularly as word of technological successes spreads in business, industry, and research circles. Individuals, too, are approaching the office more and more for guidance and assistance.

The value of a vigorous technology transfer program is becoming increasingly recognized, and larger numbers of engineers and scientists are eagerly responding to assist in the resolution of problem statements received.

All indications are that 1993 will continue to challenge the MSFC Technology Utilization Office and provide even greater opportunities to demonstrate NASA's value to the American public. NASA and the MSFC team look forward to those challenges and welcome those opportunities.

Senior MSFC management's support of the technology utilization process is evident in this photo of Harry Atkins of the National Launch System Program, Technology Utilization Director Ismail Akbay, MSFC Director Jack Lee, West Virginia Congressman Robert Wise, Space Station Projects Office's George Hopson, and Walter Lapinski of C&P Telephone in West Virginia.

Addenda

■ Annual Reports to Governors

1. *Annual Report to the Governor of the State of Alabama on the Transfer of NASA-Derived Technology.*

2. *Annual Report to the Governor of the State of Georgia on the Transfer of NASA-Derived Technology.*

3. *Annual Report to the Governor of the State of Tennessee on the Transfer of NASA-Derived Technology.*

4. *Annual Report to the Governor of the State of West Virginia on the Transfer of NASA-Derived Technology.*

5. *Annual Report to the Governor of the State of Louisiana on the Transfer of NASA-Derived Technology.*

6. *Annual Report to the Governor of the State of Mississippi on the Transfer of NASA-Derived Technology.*

■ Letters of Appreciation

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC(205)544-2121

NASA

Reply to Attn of: DA01

MAR 2 1992

The Honorable Guy Hunt
Governor of Alabama
Montgomery, AL 36130

Dear Governor Hunt:

It has been a year since we sent you the report of our activities for 1990, and it is my pleasure to transmit the report summarizing our activities for 1991.

During the third year, 250 Alabama companies and universities made 2,025 different requests, mostly for technical support packages involving various technical disciplines. Forty-four Alabama industries/agencies requested computer software packages from the Computer Software Management and Information Center (COSMIC). The increase in requests for technical support packages can be attributed to the aggressive outreach program conducted by the Technology Utilization Office. A number of application projects reported last year are complete, and we have initiated several others. We believe these projects will make a significant contribution. In 1991, MSFC awarded 2,575 contracts in Alabama totaling approximately $766 million.

This report has been discussed with Mr. Gene Anderson, Director, Alabama Department of Economic and Community Affairs. We are in agreement that our third year efforts reflect continued improvement, and we will strive to advance even further in 1992.

We at the Marshall Space Flight Center believe that the technology transfer agreement is a viable tool, and will continue to use it in 1992 to transfer NASA technology to the Alabama industrial and business community. I look forward to continuing our partnership in progress in making Alabama technology the best in the Nation.

Sincerely,

T. J. Lee
Director

Enclosure

FOREWORD

In January 1989, the Governor of the State of Alabama and the Director of the George C. Marshall Space Flight Center (MSFC) signed a Memorandum of Understanding (MOU) calling for the transfer of technology from NASA/MSFC to the private sector in Alabama. In the enclosed third annual report, we highlight a number of joint Alabama-MSFC technology transfer events, activities, and processes. Most of these were facilitated by the Memorandum Of Understanding.

Ismail Akbay

Ismail Akbay
Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center

Gene Anderson

Gene Anderson
Director, Alabama Department of Economic and Community Affairs
State of Alabama

NASA

Third Report

Memorandum of Understanding Between the State of Alabama and Marshall Space Flight Center

for
The Governor of Alabama
and the Director, Marshall Space Flight Center

February 1992

Prepared by
the Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center

1-110-2-4D

THIRD ANNUAL REPORT OF ACTIVITIES PURSUANT TO THE MEMORANDUM OF UNDERSTANDING BETWEEN THE STATE OF ALABAMA AND THE GEORGE C. MARSHALL SPACE FLIGHT CENTER

ONGOING APPLICATION ENGINEERING PROJECTS

The following projects are current NASA/private sector initiatives in the State:

Emergency Vehicle Alert System (EVAS): Currently there are millions of hearing-impaired drivers who cannot detect an approaching emergency vehicle. MSFC engineers are currently working with Applied Research, Inc., of Huntsville to develop an Emergency Vehicle Alert System. This project involves a transmitter and receiver system to measure signal strength as a function of distance. The emergency vehicles will be equipped with a transmitter which sends a digital word containing vehicle identification, direction, and location. The automobile receiver will decode this information and display the location of the emergency vehicle with respect to the automobile. A program to simulate signal strength on the computer was written based on known data, and appears to work. Plans are to build a transmitter and receiver that can interface with a computer to determine power levels required in the transmitter and define the effects of reflective waves caused by road surface; build a three-element directional antenna to test antenna pattern (over 360 degrees) vs. power level; and run system test using laptop computers to determine if the concept is feasible.

Below-the-Elbow Prosthesis: As reported in the 1991 annual report, Marshall engineers continue to investigate robotics and small mechanical devices in an attempt to improve the lifestyle of three Alabamians with prosthetic devices. The two male and one female amputees were not content with the prosthetic devices available on the market. They have cooperated with Marshall engineers to develop several specific devices and one general-purpose, rotation-actuated device. A certified prosthetist has participated in the development of a magnetic nail holder, kitchen aid carving fork and end-effector, and a kitchen aid bowl gripping end-effector for the female amputee. Plans are to develop a chain saw holder, hoe and rake holder, wheelbarrow handle holder, and a walker gripping device for one of the male amputees.

Wheelchair Suspension System: Marshall engineers are currently working with Douglas Kennedy of Haleyville, AL, and Eagle Sports Chairs of Georgia to design a wheelchair suspension for use over rough terrain. A Preliminary Design Review was held at MSFC in October 1991, with a representative of the VA Rehabilitation Center of Atlanta participating as an advisor.

PROJECTS COMPLETED IN 1991

Copeland Corporation, Hartselle: The Marshall Center, Applied Research, Inc., and Martin Marietta were successful in adapting and demonstrating a weld bead profiling sensor and welding torch control loop developed in the Shuttle External Tank program to improve the weld quality and reduce the number of reworks required on the compressor container. Demonstrations and tests have been conducted at Marshall and Copeland with the degree of success to cause optimism for commercialization of this process by Applied Research, Inc., of Huntsville, and use by Copeland Corporation.

Aircraft Duct Tests: Through the Memorandum Of Understanding between the State of Alabama and Marshall, the Components Test Branch of the Propulsion Laboratory was able to conduct an Environmental Composite Duct Test for Templeman Industries' TI Aerospace Systems of Tallassee, AL, at the request of the Technology Utilization Office. The composite air duct was developed primarily for use in military aircraft, but has applications in the commercial aircraft industry world-wide. The composite duct is 60 percent lighter than metal ducts. Marshall agreed to conduct the test when no commercial facility could be located for the test.

OUTREACH

In 1991, the Marshall Space Flight Center continued an aggressive outreach program by cooperating with various State and local agencies to promote technology transfer to the private sector of Alabama. We conducted seminars at Marshall and off-site to increase public awareness of NASA technology and its availability. The seminars at Marshall included presentations on the Technology Transfer Program, Small Business Assistance Program, Small Business Innovation Research Program, and a first-hand view of Marshall's capabilities and facilities. This type seminar was conducted for Drake Technical College, Shoals Community College, Decatur/Morgan County Industrial Development Association, Tuscaloosa Economic Development Group, Alabama Department of Economic and Community Affairs (ADECA), Alabama Development Office (ADO), Alabama Small Business Development Center (SBDC), Limestone County Industrial Development Association, and Saginaw Division of General Motors in Athens.

Marshall conducted seminars in Mobile and Auburn/Opelika in cooperation with the Chambers of Commerce and SBDC's of The University of South Alabama and Auburn University, respectively. We also conducted informal technology transfer programs in Decatur, Montgomery, Mobile, and Birmingham. Marshall's Technology Utilization Office also provided speakers on several occasions and manned an exhibit booth at the Huntsville Chamber of Commerce's quarterly "Table Top" meeting.

Marshall's Alabama representative also visited industries throughout the State and discussed the technology transfer program and its application to industry problems. These visits resulted in numerous problem statements from industry.

SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

The Small Business Innovation Research (SBIR) manager for MSFC had several meetings with small business and 8(a) companies in Alabama during the past year, and participated in the NASA/DoD SBIR workshop sponsored by the Huntsville Chamber of Commerce. This effort enhanced the awarding to eleven Alabama small businesses a total of eight Phase I contracts totaling $400,000 and five Phase II contracts totalling $2.5 million. A large percentage of those receiving Phase I contracts is expected to bid on Phase II contracts. The SBIR manager is actively seeking more SBIR participation from companies outside the Huntsville area by presenting the SBIR program at MSFC seminars and personal interaction with potential companies. Other activities included support to the State Small Business Conference, and meeting with the State Economic Development Department to help plan outreach activities.

EDUCATIONAL INITIATIVES

Through our Aerospace Education Services Program, we conducted 194 programs in schools State-wide, reaching an audience of 29,300. We also participated in 80 different teacher workshop sessions, meeting 575 teachers.

We supported the "Teaching the Future" program conducted during the summer by the University of Alabama in Huntsville by providing speakers, publications, and tours for teachers attending this aerospace program. Over 250 Alabama elementary, middle, and high school teachers participated.

We conducted a 2-week onsite teacher workshop for area educators through Alabama A&M University in June. Twenty-five North Alabama teachers spent time in the Marshall Discovery Lab learning new activities and strategies to teach science. The teachers also toured various Center facilities.

Through a donation by Sun Computers, we were able to establish a computer lab at the University of Alabama in Huntsville. The computer lab will be used by students to gain experience using the Alabama State super computer.

Through Project LASER, we provided 158 speakers to area schools, conducted 20 presentations of Discovery Club at the Huntsville/Madison County Library for several hundred students and parents, and initiated a monthly Discovery Club program at the Boys and Girls Club Learning Center. The Study Buddy (school subject study assistance) Program served 138 students using the 25 volunteers.

PROCUREMENT AWARDS

During 1991, there were 2,575 contracts awarded from Marshall to industry, commercial enterprises, and various government agencies from throughout the State of Alabama. Obligated funding from these contracts was $766,425,429.

COSMIC ACTIVITIES

NASA'S Computer Software Management and Information Center (COSMIC), which is located at the University of Georgia in Athens, has been active with Alabama companies over the past year. The COSMIC Director, Mr. John Gibson, reports that 44 Alabama firms/agencies have been served. They include large and small industries throughout the State. Also included were universities and individuals.

REQUESTS TO THE NASA CENTER FOR AEROSPACE INFORMATION (CASI)

During the second year of the Memorandum of Understanding, approximately 2,025 requests were received from Alabama companies or universities for NASA Tech Briefs Technical Support Packages (TSP), and other information involving various technical disciplines from the NASA CASI in Baltimore, MD. Marshall received 301 requests for TSP's.

SPECIAL ASSISTANT FOR AEROSPACE BUSINESS DEVELOPMENT

Mr. Harry L. Atkins made significant contributions to the success of technology transfer in Alabama as a special assistant for Aerospace Business Development. MSFC offices have supported Mr. Atkins by participating in one-on-one technical discussions with Alabama businesses.

PROPOSED ACTIVITIES FOR THE COMING YEAR

The Marshall Space Flight Center and the State of Alabama are continuing their joint technology transfer efforts. In addition to continuing work in the area of application engineering and technical dissemination, MSFC will remain active as a base for meetings, seminars, problem discussions, and outreach volunteer training. Seminars at MSFC are planned for Marshall County and Cullman/Blount County. Other seminars are planned for Montgomery, Birmingham, Alexander City, and Ozark on location.

Marshall's Technology Utilization Office and the Existing Business and Industry Service Office are planning a training session for volunteers to conduct an industry survey for a selected county in Alabama during 1992. Effort will be made to visit as many industries as possible throughout the State, since this has proven to be a good method of technology transfer.

The Technology Utilization Office will lead an effort to get the Boeing Company's Huntsville Operations more involved in the technology transfer program.

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC(205)544-2121

Reply to Attn of:

DA01

DEC 23 1991

The Honorable Zell Miller
Governor
State of Georgia
Atlanta, GA 30334

Dear Governor Miller:

In accordance with the technology transfer Memorandum of Understanding between the State of Georgia and the Marshall Space Flight Center signed on September 27, 1991, an annual report is required to summarize our joint activities and achievements. It is my pleasure to transmit this report which covers the period October 1990 - September 1991. Also enclosed is a copy of our agreement.

The past year has been very active for NASA/Georgia technology transfer. We have two applications engineering projects and have participated in a number of seminars and presentations. Further, we have visited thirteen industries jointly with Georgia Tech Research Institute (GTRI) and will continue this active industrial outreach program in the remainder of 1991 and in 1992.

As outlined in the report, a Marshall Center technology utilization team joined me for a meeting with Dr. Don Grace and his GTRI staff immediately following the September signing ceremony. We had an excellent session at that time and, as a followup, I was pleased to host Dr. Grace for a visit to the Marshall Center on November 8 and to discuss Georgia's participation in our activities.

I look forward to continuing our partnership with Georgia, specifically Georgia Tech, to enhance the economic development of your State. Our Technology Utilization team and entire research and development staff are willing to assist in every way possible to meet this objective.

Sincerely,

T. J. Lee
Director

Enclosures

Second Joint Report

Memorandum of Understanding Between the State of Georgia and Marshall Space Flight Center

for
The Governor of Georgia
and the Director, Marshall Space Flight Center

November 1991

Prepared by
the Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center
and the Director, Economic Development Laboratory
Georgia Tech Research Institute

1-2614-1-60D

FOREWORD

On September 27, 1991, Governor Zell Miller and Mr. T. J. Lee, Director of the George C. Marshall Space Flight Center (MSFC), signed a Memorandum of Understanding which reaffirmed the technology transfer accord which was previously signed in September 1989. In the enclosed second annual report, which covers the period of October 1990 - September 1991, we highlight a number of joint Georgia/MSFC technology transfer events and activities.

Ismail Akbay
Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center

Dr. David H. Swanson
Director, Economic Development Laboratory
Georgia Tech Research Institute

THE MEMORANDUM OF UNDERSTANDING BETWEEN THE STATE OF GEORGIA AND THE GEORGE C. MARSHALL SPACE FLIGHT CENTER: THE SECOND YEAR OCTOBER 1990 - SEPTEMBER 1991

ON-GOING APPLICATIONS ENGINEERING PROJECTS

Development of a Flexible Agricultural Robotic Manipulator System (FARMS) for processing live plant material, University of Georgia System, Griffin.

The Marshall Space Flight Center (MSFC) has been working with Dr. Ward Simonton of the Georgia Experiment Station in Griffin (Spalding County), in the development of a Flexible Agricultural Robotic Manipulator System (FARMS) for processing live plant material. NASA has supplied technical expertise to manufacture the end-effector and gripper for this system which robotically cuts and places live plants in plastic trays for the greenhouse industry. Over the next year, Dr. Simonton will perform an economic feasibility study which will use graphical simulation software. Technical considerations in which NASA will assist will involve the control of the gripper and selection of the best off-the-shelf robot for the system.

Wheelchair Suspension Project - Design of a New Wheelchair Flexible Rim Wheel for Use Over Rough and Uneven Terrain.

Since December 1990, MSFC has been working with Eagle Sports Chair in Snellville (Gwinett County) in the design of a new wheelchair suspension for use over rough terrain. Eagle has provided one of its wheelchairs on loan to an MSFC Structures Engineer who is designing the new suspension and will participate in the preliminary design review held at Marshall in October 1991. Also participating as an advisor was a representative from the VA Rehabilitation Center in Atlanta.

OUTREACH

The Marshall Space Flight Center (MSFC) has continued working with the 12 regional offices of the Georgia Tech Research Institute (GTRI) Economic Development Laboratory (EDL) to conduct technology transfer activities. Some of the key NASA/GTRI workshops and other outreach efforts are as follows:

November 1990	- Orientation visit to the Marshall Center by GTRI contingent to include the EDL Director and Associate Director.
April 1991	- Forwarded a 50-minute video on Marshall technology to each of the 12 GTRI regional offices which is continuing to be used with industries and other agencies wishing access to NASA and other federal technical capabilities.

May 1991	- Through GTRI, provided information on Marshall technology to 70 plant managers from throughout the State at a two-day Atlanta seminar entitled "Conservation of Electrical Energy".
July 1991	- Provided information on composites technology which was used in a special mailing to 100 firms in the Georgia plastics industry.
August 1991	- GTRI seminar in Swainsboro (Emanuel County) for the Society of Manufacturing Engineers using the MSFC video and NASA technology handouts.
August 1991	- GTRI seminar in Thomasville (Thomas County) and Moultrie (Colquitt County) for the Chamber of Commerce Existing Industry committees using NASA technical information.
August 1991	- GTRI seminar in Columbus (Muscogee County) for the Columbus Engineering Society using NASA technical information.
September 27, 1991	- At a signing ceremony at the Georgia State Capitol, a Memorandum of Understanding (MOU) was signed by Governor Zell Miller and T. J. Lee which reaffirms the commitment by both the Marshall Space Flight Center (MSFC) and the State of Georgia to perform joint technology transfer activities. Ismail Akbay was redesignated as the representative from MSFC and Dr. David Swanson, Director of the Economic Development Laboratory at GTRI, is the representative for Georgia.

VISITS TO INDUSTRY

From the period January 1991 - September 1991, a number of seminars/visits at Georgia companies were made by NASA Technology Utilization representatives accompanied by GTRI regional office engineers as follows:

Company	Product
Legion Industries (Waynesboro)	Institutional food service containers
Ricks Ram Star (Sardis)	Imprinted t-shirts and other sportswear

Torrington Corporation (Sylvania)	Automotive bearings
Gulfstream Aerospace (Savannah)	Corporate and government aircraft
Great Dane (Savannah)	Tractor trailers
ITT Rayonier (Jesup)	Chemical celanese and turpentine
Frito-Lay (Perry)	Potato chips
Bluebird Wanderlodge (Fort Valley)	Upscale recreational vehicles
Douglas and Lomason (Carrollton)	Aluminum extrusion parts for automobiles
General Electric (Rome)	Medium transformers

Note: Two visits were made to GE. A materials engineer from MSFC accompanied GTRI for the second visit to provide advice on a number of GE welding concerns.

Rome Tool and Dye (Rome)	Metallic dyes and tools
Florida Tile (Shannon)	Kitchen and bathroom ceramic tiles
Greenfield Industries (Augusta)	Drill and end mill bits

These visits to industry generated 10 technical requests to MSFC requesting assistance in a number of areas such as sound attenuation for fans, corrosion inhibitors, metallic adhesives, disposal of ceramics, and selection of coatings.

EDUCATIONAL INITIATIVES

1. The LASER Project: Learning About Science, Engineering and Research (LASER) is a major effort being undertaken in school systems surrounding the Marshall Center in Huntsville. The program includes lectures, demonstrations, and exhibits using active and retired NASA scientists and engineers.

As part of the LASER project, an industry-provided trailer has been outfitted for use as a Mobile Teacher Resource Center. It has been used effectively in the states surrounding Georgia during 1991, and specifically in Georgia during August and September. Three workshops were conducted in Atlanta from August 9-15. On August 22-23, three daily workshops were conducted in Augusta. Four workshops were conducted in Nashville (GA) on August 27-28.

An additional five sessions were conducted in Hazelhurst on August 28-30. The LASER van activities in Georgia concluded with three workshops in Bainbridge on September 3, and six sessions in Thomasville on September 10-11.

PROCUREMENT AWARDS

During fiscal year 1991, there were 297 contracts awarded from MSFC to industry, commercial enterprises, and various government agencies throughout the State of Georgia. Obligated funding from these contracts was $2,465,780.

COSMIC ACTIVITIES

NASA's Computer Software Management and Information Center (COSMIC), which is located at the University of Georgia in Athens, has continued to be very active with Georgia companies over the past year. The COSMIC Director, Mr. John Gibson, reports that 21 Georgia firms/agencies have been served. The largest user was Georgia Tech in terms of software items purchased. Other users included the University of Georgia, the USAF at Robins AFB, large industries such as Gulfstream and Lockheed, and a number of small businesses and individuals from throughout the State.

MSFC SPEAKERS BUREAU

During this period, there were six speeches given to Georgia audiences by the Marshall Speaker's Bureau. There were three speeches given in Atlanta on subjects such as the Hubble Space Telescope, Mission to Mars, and the NASA Technology Utilization program. Additional speeches were given in Marietta, at Valdosta State College, and in Helen.

REQUESTS TO THE NASA CENTER FOR AEROSPACE INFORMATION (CASI)

During the second year of the Memorandum of Understanding, 362 requests were received from Georgia companies, universities, and individuals for NASA Tech Briefs technical support packages, and other information involving various technical disciplines from the NASA Center for Aerospace Information (CASI) in Baltimore, Maryland. Some of the Georgia multiple users were AT&T, Scientific Atlanta, Rockwell International, Delta Airlines, Georgia Tech, and Mercer University.

PROPOSED ACTIVITIES FOR THE COMING YEAR

The Marshall Space Flight Center and the State of Georgia will continue their joint technology transfer efforts. We will continue to work on applications engineering projects and disseminate technical information to Georgia users. MSFC will remain active as a base for problem discussions and continue outreach to American-owned Georgia industries in an effort to enhance their competitiveness with off-shore companies. Invitations to these companies will be extended to visit the

various research laboratories at MSFC to gain an insight into available technology.

Additionally, MSFC members of the Huntsville Chapter of the Technology Transfer Society will be working closely with Dr. Swanson to sponsor the next annual meeting of the National Society to be held in Atlanta on June 24-26, 1992. The meeting will be held at the Swissotel in the Buckhead area; with the theme of "Internationalizing Technology Transfer". The conference will have three major tracks dealing with Contemporary Technology Transfer, Classic and Historical Technology Transfer and Development, and The Future for Research, Technology Development and Transfer. We anticipate a very productive meeting with attendees from throughout the United States and from several foreign nations as well.

We look forward to 1992 as a year to further nurture the excellent spirit of cooperation that has been so evident during 1991.

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC(205)544-2121

NASA

Reply to Attn of: DA01

AUG 10 1992

The Honorable Ned Ray McWherter
Governor of Tennessee
Nashville, TN 37219

Dear Governor McWherter:

It has been a year since we sent you the report of our Tennessee activities through June 1991. It is my pleasure to transmit this report summarizing our activities for the latter half of 1991, and the first half of 1992.

We believe our efforts are paying off. Tennessee companies, individuals, schools, and universities made 593 different requests to the NASA Center for Aerospace Information (CASI), mostly for technical support packages involving various technical disciplines. Fifteen Tennessee industries/agencies requested 29 computer software programs from the Computer Software Management and Information Center (COSMIC). Tennessee has led all other states in the number of requests for technical contact through our outreach program. MSFC awarded 244 direct MSFC contracts in Tennessee totaling approximately $25.7 million and awarded over $430,000 in research grants to minority universities in Tennessee.

This report has been discussed with Mr. Joe B. Brandon, Director of Existing Industry Services for the Tennessee Department of Economic and Community Development.

We at the Marshall Space Flight Center believe the Memorandum of Understanding with the State of Tennessee has resulted in interactions that would otherwise not have happened. The results have been mutually beneficial. I look forward to continuing our partnership in progress in making Tennessee technology a prime State asset.

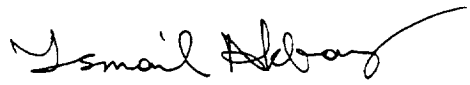
Sincerely,

T. J. Lee
Director

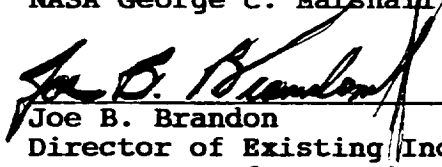
Enclosure

FOREWORD

In June 1989, the Governor of the State of Tennessee and the Director of the George C. Marshall Space Flight Center (MSFC) signed a Memorandum of Understanding (MOU) calling for the transfer of technology from NASA/MSFC to the private sector in Tennessee. In the enclosed annual report, we highlight a number of joint Tennessee-MSFC technology transfer events, activities, grants, initiatives, and programs. Most of these were enhanced by the MOU agreement.



Ismail Akbay
Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center



Joe B. Brandon
Director of Existing Industry Services
Department of Economic and Community Development
State of Tennessee

NASA

Third Report

Memorandum of Understanding Between the State of Tennessee and Marshall Space Flight Center

for
The Governor of Tennessee
and the Director, Marshall Space Flight Center

June 1992

Prepared by
the Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center

1-110-2-4D

THIRD ANNUAL REPORT OF ACTIVITIES PURSUANT TO THE MEMORANDUM OF UNDERSTANDING BETWEEN THE STATE OF TENNESSEE AND THE GEORGE C. MARSHALL SPACE FLIGHT CENTER

ONGOING APPLICATION ENGINEERING PROJECTS

WELDSMART, A Vision-Based System for Weld Quality Inspection: Development work has been completed on this project affiliated with Mid-South Engineering of Nashville. WELDSMART is a system for performing visual inspection of welds and combines an image processing system with an expert systems interface. The project's final report is currently being prepared by Mid-South. Pending the results and evaluation of this new technology, further activities, including the placement of a system at Marshall, will be discussed. Prior funding to this project was $50,000.

The Development of ROBOSIM for Industrial/Academic Use: ROBOSIM is a graphics-based simulator for the development of robotic systems which was jointly developed by NASA and Vanderbilt University. ROBOSIM has been used as a cost-effective method for rapid prototyping of robotics and automation, and has been used for both Earth-based industrial systems and space systems planning.

Since the last report, development of the initial simulator has been completed. Vanderbilt is currently developing plans with NASA for the nationwide distribution of ROBOSIM for use by colleges, universities, and engineering schools. Elements of this plan include an initial phase in which the package is released to a limited number of schools for cooperative evaluation; a second phase which will result in the distribution to approximately 500 schools; and the third phase of commercial introduction to the industrial community. NASA funding to this project was $44,998.

The University of Tennessee Center for Industrial Services: The MSFC laboratories are assisting in providing solutions for problems from three Tennessee firms who sought help through the UT-Center for Industrial Services. Representatives from Great Dane Trailers in Memphis are scheduled to visit MSFC for a briefing on composite materials and manufacturing processes.

MATURED TECHNOLOGY TRANSFER ACTIVITY

The Materials and Processes Laboratory has made a successful transfer of NASA technology to the Lynchburg Machine Company, Lynchburg, Tennessee, in the area of "Flash Chrome" application/process.

In January 1990, Martin-Marietta of New Orleans, a prime contractor of the Marshall Center, and an extension of Marshall's Technology Utilization Office, entered into a contract with United Services Equipment Company (USECO) of Murfreesboro, to provide Space Shuttle External Tank technology for the redesign of a thermal barrier curtain used to divide the hot and cold sides in a unitray food delivery cart.

MATURED TECHNOLOGY TRANSFER ACTIVITY (CONT'D)

This contract has been completed and USECO reports a significantly improved product expected to result in increased annual sales. This project was selected by NASA Headquarters for airing over the NASA Select Satellite channel in January 1992.

Portable Powered Seat Lift: In the last report, we identified this as an ongoing application project with Dr. David W. Gaw of the Southern Hills Medical Center in Nashville. The Marshall Center has arrived at prototype design stage and the design/concept is being refined for production by a manufacturing engineer working for Dr. Gaw who has applied for an exclusive license to manufacture and sell the seat lift.

Jack Daniels Particulate Problem: Two on-site plant visits were made to Jack Daniels by scientists from the Materials & Processes Lab and the Propulsion Lab. After an evaluation of plant conditions, a letter of recommendation with numerous ideas for reducing airborne particulate was submitted to Jack Daniels for consideration. Implementation is pending.

Electric Motor Spring Breakage: Magnetek-Century Electric in McMinnville was experiencing an excessive amount of "spring failure" in the governor switch of their electric motor production. A detailed failure analysis by the Metallic Materials Division of the Materials & Processes Lab identified the problem which was subsequently made known to the spring manufacturer/supplier, and resulted in a correction to the manufacturing process.

OUTREACH

In 1991, the Marshall Space Flight Center (MSFC) cooperated with various organizations from the State of Tennessee to promote technology transfer to the private sector of Tennessee. The Center participated in seminars, meetings, and expositions to increase the awareness of benefits to technology transfer. These activities were as follows:

-- Presented the NASA technology transfer display booth with staff to the 39th annual Tennessee Governor's conference in Nashville in November 1991.

-- Attended all quarterly meetings of the Tennessee Association of Small Business Services (TASBS) sponsored by the Tennessee Department of Economic and Community Development.

-- Provided program speaker to the Chattanooga Chapter of the Tennessee Society of Professional Engineers in May 1992.

-- Provided non-affiliated and scientific judges to the Richland Elementary School Science Fair in Lynnville, Tennessee, in March 1992.

-- Presented an overview of the Space Shuttle Redesigned Solid Rocket Motor to the Memphis State University Physics Department faculty and students in April 1992.

OUTREACH (CONT'D)

-- The Observatory Projects Office provided a guest speaker to the Chattanooga section of the American Society of Mechanical Engineers in April 1992.

-- Provided judges to the International Science and Engineering Fair held in Nashville in May 1992.

-- The MSFC Payload Projects Office sponsored a follow-on Continuous Improvement workshop in Nashville at the Loews Vanderbilt Plaza in May 1992. The purpose of the workshop was to address ways to improve the MSFC payload integration process.

-- On Career Day at the Grassland Middle School in Franklin, Tennessee, the MSFC Payload Project Office presented a briefing on the recently completed MSFC-managed ATLAS-1 mission, which focused on the Atmospheric Emissions Photometric Imaging experiments.

-- At the Oak Ridge National Laboratory (ORNL), the MSFC Payload Projects Office is sponsoring a ground-based experiment entitled "Modular Electromagnetic Levitation Project". The funding level for this project in FY 1992 is approximately $390,000.

-- The University of Tennessee Space Institute is being funded at approximately $260,000 per year as Principal Investigator for the "Casting and Solidification Technology" experiment of the International Microgravity Laboratory.

-- The Oak Ridge National Laboratory is a major participant in the hydrogen test standardization round-robin test program. They are now managing the low cycle fatigue round-robin.

-- Vanderbilt University is being funded for evaluation of "Weldalite-2219" aluminum welds by microstructural studies and failure analyses.

-- Two on-site visits by MSFC engineers have been made to the Jack Daniels Distillery for assistance in identifying NASA technology for solving problems associated with material failure, state-of-the-art sensors, waste treatment, and contamination control.

-- The Materials and Processes Laboratory provided support in wind tunnel testing to the Arnold Engineering Development Center in Tullahoma.

-- The MSFC University Affairs Office was an active participant in meetings held in connection with Tennessee's Space Grant Consortium.

-- Representatives of Dyersburg State Community College, Dyersburg, Tennessee, were hosted at MSFC in their search for information on implementing new curriculum in Manufacturing Systems Technology for their new off-campus facility in Trenton, Tennessee.

OUTREACH (CONT'D)

-- NASA engineers, via the Technology Transfer Program, have provided assistance and evaluation to Computer Applications Services of Signal Mountain, Tennessee, and Tennessee Technical University, jointly working on robotic designs for TVA.

-- Provided a TU briefing to the Murfreesboro Chamber of Commerce in July 1991.

-- Participated in a training program for volunteers from Franklin, Grundy, Moore, and Cannon counties of Tennessee, sponsored by the Tennessee Valley Aerospace Region (TVAR) for the purpose of implementing new technology to these counties.

-- Provided an MSFC tour and TU briefing on technology transfer to volunteers from a four-county area of Tennessee and the Director of TVAR.

-- Provided a TU briefing to managers of industry in Giles County Tennessee.

-- Interfaced with Sam Geise, President of Fluid Tools and Research Co. of Memphis, on a cooperative proposal to develop a new cutting tool.

-- Provided a TU briefing to manufacturing officials from the City of Sparta.

-- Provided technology input to Research Triangle Institute of North Carolina for transfer to the City of Knoxville in support of providing solutions to critical city problems.

-- Provided a TU briefing to a group of Warren County volunteers who were conducting a technology transfer survey of all industries in Warren County.

-- Hosted a visit and tour of the MSFC facility by Johnny Hayes, Commissioner of the Tennessee Department of Economic and Community Development.

-- Developed a Space Act Agreement for cooperative research in propulsion systems with Mr. W. H. Knuth of the University of Tennessee at CALSPAN and the Center for Space Transportation and Applied Research (CSTAR).

-- Mr. Tom Bailey, Director of the Tennessee Valley Aerospace Region at UTSI, has been named a member of the "Continuous Improvement Team" formed by the MSFC TU Office to increase and enhance all aspects of technology transfer.

-- Participated in the Industry Partnership Forum sponsored by UTSI at Tullahoma in May 1992. The purpose was to foster cooperative research and development projects between UTSI and the private sector.

-- Attended all quarterly meetings of the Tennessee Valley Aerospace Region sponsored by UTSI.

OUTREACH (CONCLUDED)

Pre-College Outreach Efforts: Through the Aerospace Education Services Program (AESP), MSFC representatives visited 78 Tennessee schools, reaching an audience of 46,848. AESP also participated in 35 teacher workshops and supported the Tennessee Space Week.

-- The NASA Tri-State Educational Specialist, Mr. J. R. Pruitt, has attended various faculty/staff and assembly programs in Chester, Henderson, Hardin, Lawrence, and McNairy counties.

-- Five Tennessee teachers borrowed educational lunar samples through our Lunar Sample Education Program. An estimated 1,161 students participated in educational activities presented by those teachers.

-- The Project LASER (Learning About Science, Engineering and Research) Mobile Teacher Resource Center visited Savannah, Tennessee, providing access to teacher enrichment materials for 36 teachers.

-- Through the MSFC Speakers Bureau, we provided 16 speakers to various educational, professional, and technical organizations during this reporting period.

INREACH

-- Vanderbilt University is providing support to the Marshall Space Flight Center (MSFC) Microgravity Science and Applications Division with Studies of Containerless Processing of Selected NB-based alloys and Containerless Processing of Oxide Superconductors.

-- Fisk University is providing support to the MSFC Microgravity Science and Applications program through the Center for Photonic Materials and Devices established by NASA as part of the Historically Black Colleges and Universities 5-year program. These studies provide specific support to the Microgravity Sciences on I-VI binary and ternany compounds and crystal growth experiments performing thermal, spectroscopic, optical, and electrical characterization of those crystals. This Core Research Center Grant is for approximately $500,000.

-- The Oak Ridge National Laboratory is designing and building a magnetic levitator for the containerless processing of metals and alloys to be flown on the KC-135 aircraft in support of the MSFC Microgravity Science and Applications program.

-- Arnold Engineering Development Center provided a guest speaker to MSFC at a SYSTEM SAFETY COURSE in May 1992.

-- Representatives of the Tennessee ECD and UTSI attended an MSFC-hosted demonstration of a software program associated with the Regional Contracting Assistance Center of West Virginia.

INREACH (CONCLUDED)

-- The Engineering Research and Consulting (ERC) Co., of Tullahoma, is currently carrying out experimental research on the outflow from porous surfaces into an external crossflow. This work is done in an MSFC test rig and in an ERC test set-up at Tullahoma.

-- Accurate Automation Corporation (AAC) of Chattanooga is currently developing a complete neural-net-based teleoperator control system offering the flexibility needed to support both space and ground-based manipulators. Funding for this development was through the SBIR program.

-- The Arnold Engineering Development Center is utilized by the Induced Environments Branch of the Aerophysics Division for testing of various composite materials in the Von Karman Facilities for use on the External Tank and Solid Rocket Boosters of the Space Shuttle.

EDUCATIONAL INITIATIVES

College Research Grants: In 1991, the Summer Faculty Fellowship program employed one professor each from Fisk University, Tennessee Tech, and UT-Chattanooga. In 1992, this program employed one professor each from Fisk University, Columbia State Community and UT-Chattanooga.

-- Four graduate students from Vanderbilt University, Tennessee Tech, and the University of Tennessee Space Institute were funded on the Graduate Student Researchers Program.

-- Vanderbilt University and Fisk University each has one professor working on NASA's Joint Venture (JOVE) initiative.

-- Dr. Fayssal Safie of the MSFC Analysis Branch, Reliability and Maintainability Division, provided a technical interchange with Dr. Tom Cruse and his students at Vanderbilt University on the use of probabilistic design analysis for aerospace hardware.

-- The Tri-State Education Initiative involves 29 school districts in a 50-mile radius of the Yellow Creek Advanced Solid Rocket Motor division, bordering the states of Alabama, Mississippi, and Tennessee. NASA facilitated this innovative reform effort by assisting the communities who themselves want a world-class education system to help students obtain the skills for high-tech jobs of the future.

-- Funding of $152,665 for the third year of a continuing award grant was extended to Tennessee State University for Photometric and Spectroscopic study of Chromospherically Active Stars. Total funding for this grant, including all supplements, is $464,282.

CIVIL SPACE TECHNOLOGY INITIATIVE (CSTI)

Optical Plume Anomaly Detection: This research involves development of new and original computerized codes for study of hot gas streams. The project is jointly sponsored by MSFC and NASA Headquarters through the CSTI research and development program. Papers on this work have been presented in Nashville at meetings of AIAA/SAE/RSEE/ASME Joint Propulsion Conferences.

Optical Processing for Leak Detection: This research studies the fast detection of nonstandard features moving within an otherwise constant background. Funding for this project is also jointly sponsored by MSFC and NASA Headquarters operating at the University of Tennessee Space Institute in Tullahoma.

TENNESSEE REQUEST FOR TECHNICAL ASSISTANCE

Since the signing of the Memorandum of Understanding, the Technology Utilization Office has received a total of 133 problem statements from Tennessee, with 60 applicable to this report, of which 3 were referred to other sources for response and 17 were considered "out-of-scope" to technology transfer or no expertise existed at MSFC, and thus received a negative response from MSFC. The remaining 40 received positive action or remain in active review/evaluation. Tennessee has led all states in the number of requests for technical contact through the MSFC outreach program.

COSMIC ACTIVITIES

NASA's Computer Software Management and Information Center (COSMIC), which is located at the University of Georgia in Athens, has been active with Tennessee companies over the past year. The COSMIC Director, Mr. John Gibson, reports that 15 Tennessee firms/agencies have been served with 29 orders for software. They include large and small industries throughout the State. Also included were universities and individuals.

REQUESTS TO THE NASA CENTER FOR AEROSPACE INFORMATION (CASI)

During the third year of the Memorandum of Understanding, approximately 593 requests were received by the NASA CASI in Baltimore, Maryland, from Tennessee companies or universities for NASA Tech Briefs Technical Support Packages and other information involving various technical disciplines from all nine of the NASA Centers.

PROCUREMENT AWARDS

The Tennessee economy was the recipient of $38,093,000 NASA prime and subcontract awards for FY 1991, of which $25,701,214 originated at the Marshall Space Flight Center and represents approximately 244 contracts awarded to industry, academia, and various Government agencies throughout Tennessee.

ECOMOMIC IMPACT

As of October 5, 1991, there were 99 civil service employees working at the Marshall Space Flight Center and living in Tennessee. This translates into approximately $4.2 million dollars going into the Tennessee economy via personal salaries alone. Of these numbers, 58 of these employees reside in Lincoln County with an annual payroll of approximately $2.5 million.

SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

Two Tennessee small business firms, McGowan, Mullican, & Dunn of Nashville, and Accurate Automation Corporation of Chattanooga, were recipients of Phase II contracts valued at approximately $500,000 each. Engineering Research & Consulting (ERC) of Tullahoma received a Phase I contract totaling $50,000 from the Jet Propulsion Laboratory (JPL) in California. The SBIR manager for MSFC had several meetings with small business companies from Tennessee during the past year.

The SBIR manager is actively seeking more SBIR participation from Tennessee by presenting the SBIR program at MSFC seminars and personal interaction with potential companies. Examples of this effort include presentations at MSFC as an element of outreach activities sponsored by the Technology Utilization Office.

YELLOW CREEK PRODUCTION FACILITY

During this reporting period, a total of 20 contracts were awarded to Tennessee firms for work at this site. The site operator, Lockheed/Aerojet, reports that 11 percent of its employees reside in Tennessee.

The 601 construction employees from Tennessee represent 22 percent of the construction work force since the project started. Community activity by the site operator and the construction companies, have consisted of procurement seminars, speaking engagements, and monetary contributions to numerous charities and community causes. Project personnel have made educational presentations to 13 schools within the local impact area.

PROPOSED ACTIVITIES FOR THE COMING YEAR

The Marshall Space Flight Center and the State of Tennessee are continuing their joint technology transfer efforts. In addition to continuing work in the area of applications engineering, MSFC will remain active as a base for meetings, seminars, problem discussions, and dissemination. The Center plans to participate in the 40th Annual Governor's Conference in Nashville which highlights technology and economic developments. A booth will be set up and staffed at the event.

The initial training program workshop on the Federal Laboratory Consortium (FLC) was scheduled to be held in Nashville. The Center will provide a briefing on NASA technology transfer during the session.

PROPOSED ACTIVITIES FOR THE COMING YEAR (CONT'D)

Initial discussions with the University of Tennessee Space Institute (UTSI) are expected to lead to a cooperative effort to prepare a manual usable by communities all across the U.S. as a guide to conduct surveys of local industries. UTSI is also expected to conduct all surveys in additional Tennessee counties searching for industrial problems. The Marshall Center will offer its services to review and respond to problem statements penetrated through this effort.

In general, the Marshall Center Technology Utilization Office staff is looking forward to activities in Tennessee to serve as role models for other states and other Government laboratories.

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC(205)544-2121

NASA

Reply to Attn of: DA01

JUN 2 2 1992

The Honorable Robert C. Byrd
United States Senate
Washington, DC 20510

Dear Senator Byrd:

Since 1989, the State of West Virginia has had a co-signed Memorandum of Understanding (MOU) with NASA's Marshall Space Flight Center, Langley Research Center, and the Goddard Space Flight Center. The MOU focuses on efforts to facilitate the transfer of NASA/Federal technology to West Virginia's private sector. Utilizing the MOU as a springboard, teams of NASA specialists have been canvassing the State, talking to groups of entrepreneurs, visiting factories, lecturing in the classrooms, and encouraging West Virginians to become involved. Enclosed is the third annual report which summarizes last year's initiatives for the period of March 1991 - March 1992, and outlines our plans for activities in West Virginia for the coming year.

We believe our efforts are paying off. In 1991, NASA specialists addressed an estimated 900 industrialists, NASA received 200 requests for technical support packages, and four specific requests for technical assistance. Across the State, our education specialists reached over 15,000 students with messages designed to stimulate interest in science and technology.

We at NASA look forward to a continuing fruitful relationship with West Virginia in the years to come.

Sincerely,

T. J. Lee
Director
Marshall Space Flight Center

Paul F. Holloway
Director
Langley Research Center

Dr. John M. Klineberg
Director
Goddard Space Flight Center

Enclosure

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC(205)544-2121

NASA

Reply to Attn of: DA01

JUN 22 1992

The Honorable Gaston Caperton
Governor of West Virginia
Charleston, WV 25305

Dear Governor Caperton:

Since 1989, the State of West Virginia has had a co-signed Memorandum of Understanding (MOU) with NASA's Marshall Space Flight Center, Langley Research Center, and the Goddard Space Flight Center. The MOU focuses on efforts to facilitate the transfer of NASA/Federal technology to West Virginia's private sector. Utilizing the MOU as a springboard, teams of NASA specialists have been canvassing the State, talking to groups of entrepreneurs, visiting factories, lecturing in the classrooms, and encouraging West Virginians to become involved. Enclosed is the third annual report which summarizes last year's initiatives for the period of March 1991 - March 1992, and outlines our plans for activities in West Virginia for the coming year.

We believe our efforts are paying off. In 1991, NASA specialists addressed an estimated 900 industrialists, NASA received 200 requests for technical support packages, and four specific requests for technical assistance. Across the State, our education specialists reached over 15,000 students with messages designed to stimulate interest in science and technology.

We at NASA look forward to a continuing fruitful relationship with West Virginia in the years to come.

Sincerely,

T. J. Lee
Director
Marshall Space Flight Center

Raul F. Holloway
Director
Langley Research Center

Dr. John M. Klineberg
Director
Goddard Space Flight Center

Enclosure

NASA

Third Report

Memorandum of Understanding Between the State of West Virginia, Marshall Space Flight Center, Langley Research Center, and Goddard Space Flight Center

for
Senator Byrd of West Virginia,
the Governor of West Virginia,
and the Directors, Marshall Space Flight Center, Langley Research Center, and Goddard Space Flight Center

May 1992

Prepared by
the Director, Technology Utilization Office
NASA/George C. Marshall Space Flight Center

1-1525-2

FOREWORD

In March 1989, the Governor of the State of West Virginia and the Directors of the Marshall Space Flight Center (MSFC), Langley Research Center (LaRC), and the Goddard Space Flight Center (GSFC) signed a Memorandum of Understanding (MOU) calling for the transfer of technology from MSFC/GSFC/LaRC to the private sector in West Virginia. In the enclosed third annual report, we highlight joint West Virginia/MSFC/LaRC/GSFC technology transfer events, activities, and processes. Most of these were facilitated by the MOU agreement.

Ismail Akbay
Director, Technology Utilization Office
Marshall Space Flight Center

Dr. George Alcorn
Office of Commercial Programs
Goddard Space Flight Center

Joe J. Mathis, Jr.
Head, Technology Utilization & Applications Office
Research Information and Applications Division
Langley Research Center

Ann Johnson
Director, Department of Economic & Community Affairs
State of West Virginia

THE MEMORANDUM OF UNDERSTANDING BETWEEN THE STATE OF WEST VIRGINIA, MARSHALL SPACE FLIGHT CENTER, LANGLEY RESEARCH CENTER AND THE GODDARD SPACE FLIGHT CENTER: THE THIRD YEAR

In March 1989, NASA's Marshall Space Flight Center, Langley Research Center, and Goddard Space Flight Center co-signed a Memorandum of Understanding (MOU) with the State of West Virginia. The objective was to facilitate the transfer of NASA space-derived technology to West Virginia's private sector, creating more employment opportunities, more competitive businesses, and an improved statewide economy.

OUTREACH ACTIVITIES

In 1991, MSFC, LaRC, and GSFC continued an aggressive pursuit of technology transfer activities by cooperating with various state and local agencies to promote technology transfer to the private sector of West Virginia. Seminars were conducted at MSFC and off-site to increase public awareness of NASA/Federal technologies and their availability. The following highlights our past year of activities:

- On May 31, 1991, NASA personnel discussed technology developments at the Software Valley Conference sponsored by Senator Robert C. Byrd.

- In September 1991, a delegation comprised of personnel from NASA, the West Virginia Governor's Office, the National Technology Transfer Center (NTTC) in Wheeling, and the Mid-Atlantic Regional Technology Transfer Center (RTTC) conducted six seminars across West Virginia. In the cities of Fairmont, Wheeling, Parkersburg, Huntington, Beckley, and Charleston, technology transfer and NASA contracting opportunities were discussed.

- On November 12, 1991, Dr. Wayne Littles, MSFC Deputy Director, described the Nation's space program and opportunities at the Putnam County, West Virginia Chamber of Commerce annual dinner.

- On November 13-14, 1991, MSFC hosted a 2-day seminar for a group of West Virginia industrial and economic development officials. Topics included NASA's Technology Transfer Program, Small Business Assistance, and Small Business Innovative Research Programs. The seminar also included a tour of MSFC, showing capabilities and resources.

- On February 6, 1992, Ismail Akbay, Director, Technology Utilization Office, MSFC, discussed NASA's Technology Transfer Program at the Rotary Club in Martinsburg, West Virginia.

- On February 12, 1992, and March 31, 1992, seminars were held in Fairmont and Hurricane, West Virginia. NASA personnel discussed technology transfer as well as opportunities for Small Business Innovative Research program.

- Hosted West Virginia Businessmen at 1-day meeting at NASA/GSFC in June 1991.

OUTREACH ACTIVITIES (CONTINUED)

A new addition to the Outreach Program is the establishment, implementation, and continuation of search teams that visit industries which may have a need for NASA/Federal technology. Based on a model first developed in Warren County, Tennessee, teams of local volunteers such as local businesses, Chambers of Commerce, and NASA participants visit every industry in their designated area (usually a county) in an attempt to ferret out problems or opportunities. This is a joint program between Federal and State officials. While NASA is concerned with possible technical problems a company may be having, State officials look at ways to boost manufacturing and keep existing businesses open. The program was initiated in Pendleton County, West Virginia, on April 20-22, 1992.

There is evidence that these Outreach initiatives are paying dividends. Langley Research Center reports that as much as 20 percent of publications requested from their Public Inquiry Office were distributed to West Virginia firms. The flow of queries from West Virginia firms is increasing monthly, with businesses requesting further data about NASA Tech Briefs articles, NASA software, and technical assistance.

EDUCATIONAL INITIATIVES

NASA/MSFC sponsors a Mobile Teacher Resource Center called LASER (Learning About Science, Engineering, and Research). In October 1991, the LASER van toured West Virginia conducting 38 workshops in the counties of Mercer, McDowell, Wyoming, Summers, Monroe, Fayette, Clay, Upshur, Randolph, Doddridge, Ritchie, Pleasants, and Wetzel, and in the cities of Sisterville, Moundsville, and Fairmont. All four congressional districts were served.

Another NASA-supported initiative, the Aerospace Engineering Service Project (AESP), was highly active in West Virginia, reaching thousands of students.

One hundred and seven elementary and secondary teachers participated in five aerospace workshops. A total of 15,129 elementary and secondary students participated in the lecture demonstration program in FY 1992.

- 6,259 elementary students participated in the AESP lecture demonstration program.
- 1,640 middle school students participated in the AESP lecture demonstration program.
- 5,625 high school students participated in the AESP lecture demonstration program.
- 1,574 students participated in the classroom program.
- 59 schools were visited as a part of the AESP program.

EDUCATIONAL INITIATIVES (CONTINUED)

LaRC played a significant role in West Virginia's Science Fair Competition, awarding certificates for first place and outstanding achievement; issuing invitations to first place winners to attend LaRC's Science Fair Winner Day program; and awarding a scholarship to Space Camp in Huntsville, Alabama, to the first place winner from West Virginia.

NASA/University Joint Venture (JOVE) - A program to make research opportunities related to NASA missions available to a broader spectrum of colleges and universities. NASA makes space science data and NASA resources available to the university resources available to the university researchers in exchange for the university providing faculty and student support on a matching funds basis to carry out the research.

Dr. Matthew Scanlon, Department of Chemistry, Fairmont State University, Fairmont, West Virginia, is currently working at GSFC on a study of atmospheric gas phase reactions important in the formation of ozone in the Earth's stratosphere and of hydrocarbons in Jupiter's atmosphere.

NASA Historically Black Colleges and Universities (HBCU's) Initiative - Awards research grants to investigators at HBCU's working in areas of mutual interest to the GSFC. Dr. Craig Spaniol, West Virginia State College, is Principal Investigator on an HBCU research grant, "Magnetic Measurements of the Earth-Ionspheres Cavity Resonances."

NASA Graduate Student Researchers Program (GSRP) - Provides highly qualified graduate students in residence at their home institution with fellowship support on research projects of mutual interest to their faculty advisor and a GSFC mentor.

Ramon L. Roman, Department of Mechanical & Aerospace Engineering, West Virginia, has just completed the third and final year of a GSRP Fellowship, working on "Automated Assembly in Space-Station by Robots" with Goddard mentor.

Sahr A. Josiah-Faeduwor, Department of Electrical & Computer Engineering, West Virginia University, has just completed the third and final year of a GSRP Fellowship, working on "Upgrading Sensitivity, Reliability, and Response of the NASA Capaciflector Using Fuzzy Logic" with Goddard mentor.

SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

SBIR managers from NASA Headquarters, MSFC, LaRC, and GSFC hosted, participated in, or supported a number of meetings with small businesses and community and industrial development officials from West Virginia during the past year. These managers have actively sought participation from West Virginia small businesses by presenting and discussing the SBIR program in West Virginia and NASA center meetings with business and industrial groups, as well as by personal interaction with potential companies. These efforts enhanced SBIR proposal submission from West Virginia firms. One company, Resource Technology Group, received a Phase II contract from MSFC and is developing "Thin Membrane Sensors" under that $500K contract.

PROCUREMENT AWARDS

In addition to the Phase II contract awarded to Resource Technology Group in Morgantown, West Virginia, MSFC awarded a contract to JOVE (JOint VEnture), a joint NASA/West Virginia University program in space science research.

COSMIC ACTIVITIES

COSMIC is NASA's Computer Software Management and Information Center. COSMIC's role as part of NASA's Technology Transfer Network is to ensure that industry, other Government agencies, and academic institutions will have access to NASA's advanced computer software technology. Since its beginning in 1966, COSMIC has been operated by the University of Georgia. NASA's ongoing development of software provides new programs for the COSMIC inventory throughout the year. Mr. John Gibson, Director of COSMIC, reports that West Virginia firms, agencies, universities, and individuals have requested software programs from COSMIC during the past year.

REQUESTS TO THE CENTER FOR AEROSPACE INFORMATION (CASI)

Requests for NASA Tech Briefs Technical Support Packages (TSP's), and other information involving various technical disciplines provided by NASA CASI in Baltimore, Maryland, continued to gain momentum during 1991. West Virginia companies and/or universities were provided with 200 TSP's during 1991, an increase of 82 percent over the previous year.

NATIONAL TECHNOLOGY TRANSFER CENTER

In response to an FY90 congressional mandate, NASA formed the National Technology Transfer Center (NTTC) located at Wheeling Jesuit College, Wheeling, West Virginia. The purpose and scope of the NTTC is to promote U. S. industry's use of technology and strengthen the domestic economy. Also, to compete in global markets, Federal agencies are joining together with the private sector in the National Technology Initiative (NTI). The Initiative will promote a better understanding of opportunities for industry to commercialize new technology advances. It will highlight the Federal Government's investment in science and technology, much of which may have commercial potential. The Initiative seeks business expansion through the following:

- Increased application of both Federally and privately supported technology
- The creation of more high value-added jobs for Americans
- The establishment of new contacts for business cooperation

Conferences will be held during the year in several regions, paralleling a successful 1991 series to promote exports. In conjunction with these conferences, Federal agencies will be accelerating their effort to make it easier for the private sector to commercialize technology advances.

ONGOING APPLICATION ENGINEERING PROJECTS

A new initiative in Concurrent Engineering (CE) (multiple engineering functions taking place simultaneously within an integrated system, e.g., design, modeling, simulation, and manufacturing planning) has been presented to NASA Headquarters to build upon ongoing CE activities that are currently being supported by various Government agencies, universities, and industrial partners.

GSFC is collaborating with West Virginia University to bring GSFC into the mainstream of CE capability developers. West Virginia University is one of the leading institutions in CE.

PROPOSED ACTIVITIES FOR THE COMING YEAR

- On June 1, 1992, MSFC will host Congressman Bob Wise from West Virginia, along with approximately 20 West Virginia companies and government officials.

- On June 22, 1992, MSFC will host a group from the Regional Contract Assistance Center of West Virginia. Executive Director, Mic Walker, will demonstrate an Electronic Data Interchange software program developed by D. N. American, a small West Virginia business. Program capabilities and funding for the development of the program will also be discussed.

- In July 1992, Mr. Akbay will speak at the Software Valley Conference sponsored by Senator Robert Byrd.

- July 1992 - November 1992, MSFC and GSFC plan to jointly hold seminars throughout the State. The target is one seminar a month and to also continue with the Technology Transfer Initiative by visiting as many industries as possible in conjunction with these seminars.

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC(205)544-2121

NASA

Reply to Attn of:

DA01

APR 1 3 1992

The Honorable Edwin Edwards
Governor of Louisiana
Baton Rouge, LA 70804

Dear Governor Edwards:

In accordance with the technology transfer Memorandum of Understanding between the State of Louisiana, the Marshall Space Flight Center, and the Stennis Space Center signed on October 27, 1989, an annual report is required to summarize our joint activities and achievements. It is my pleasure to transmit this report which covers the period November 1990 through October 1991. Also enclosed is a copy of our agreement.

The past year has been very active for NASA/Louisiana technology transfer. We have three application engineering projects and have participated in a number of seminars and presentations. Further, we have visited nine industries, and will continue this active industrial outreach program in 1992.

We look forward to continuing our partnership with Louisiana to enhance the economic development of your State. Our Technology Utilization Team and entire research and development staff are willing to assist in every way possible to meet this objective.

Sincerely,

T. J. Lee
Director
George C. Marshall Space Flight Center

Gerald W. Smith
Acting Director
John C. Stennis Space Center

Enclosures

FOREWORD

In October 1989, the Governor of the State of Louisiana and the Directors of the George C. Marshall Space Flight Center (MSFC) and John C. Stennis Space Center (SSC) signed a Memorandum of Understanding calling for the transfer of technology from NASA to the private sector of Louisiana. In the enclosed second annual report, we highlight a number of joint Louisiana/NASA technology transfer events, activities, and processes. Most of these were set in motion or facilitated by the groundbreaking 1989 agreement.

Ismail Akbay
Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center

Robert M. Barlow
Technology Utilization Officer
NASA John C. Stennis Space Center

Kevin P. Reilly, Sr.
Secretary of Economic Development
State of Louisiana

Second Joint Report

Memorandum of Understanding Among the State of Louisiana, Marshall Space Flight Center and Stennis Space Center

for

The Governor of Louisiana,
Director of Marshall Space Flight Center,
and Director of Stennis Space Center

February 1992

Prepared by
the Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center;
Technology Utilization Officer,
NASA John C. Stennis Space Center;
and Secretary of Economic Development,
State of Louisiana

1-1114-2

THE MEMORANDUM OF UNDERSTANDING AMONG THE STATE OF LOUISIANA, GEORGE C. MARSHALL SPACE FLIGHT CENTER AND JOHN C. STENNIS SPACE CENTER: THE SECOND YEAR

ON-GOING APPLICATIONS ENGINEERING PROJECTS

NASA is currently conducting a stress analysis on a one-piece composite design "bionic" ankle for Copes Foundation of Baton Rouge. This design will improve an existing prosthetic ankle of titanium with ball joint and spring for natural motion. The new composite design will be lighter, more functional and durable, and will allow an even better natural motion. This project will be completed in FY 1992.

During FY 1991, NASA completed a Visitor Investigator Program with Veron F. Meyer and Associates of New Orleans, that investigated the use of remotely sensed data for gathering basic coastline information such as hydrological, ecological, subsidence, and sedimentation.

During FY 1991, NASA started a Visitor Investigator Program with Environmental Enterprises USA, Inc., of Slidell, that will investigate the use of remotely sensed data to assess regional environments, particularly the location and inventory of wetlands.

During FY 1991, NASA continued an Applications Engineering Project with Ochsner Medical Foundation of New Orleans, in the area of image compression. Difficulties were encountered in the patenting process for the technology central to the project. Both parties remain optimistic that issues with the Office of Patents and Trademark can be resolved and work will continue in FY 1992.

OUTREACH

Technology Utilization personnel representing the Marshall Space Flight Center (MSFC), Stennis Space Center (SSC), and Martin Marietta Manned Space Systems (MMMSS), under contract to MSFC, conducted an aggressive outreach program in Louisiana during FY 1991. This collective group (hereafter referred to as NASA) conducted the following outreach activities:

- Hosted exhibit booth at 7th Annual Small Business Contract Opportunities show in Baton Rouge on October 11.

- Seminar at Michoud Assembly Facility on Variable Polarity Plasma Arc Welding and Tooling required to support welding on October 16. Seven different companies were represented for this 1-day seminar.

- Presentation to American Society of Quality Control at Lake Charles on December 10.

- Seminar in Monroe on January 17-18 in conjunction with Louisiana Department of Economic Development, Small Business Development Center at Northeast Louisiana University, and the Monroe Chamber of Commerce. Fifty-two people attended and responded in a positive manner concerning the value of the seminar.

- Presentation to New Orleans Chapter of the National Association of Women in Construction on May 13.

- Seminar in Alexandria on June 21 to create a technology transfer circle comprised of community and Louisiana Department of Economic Development leaders to meet the private and public sectors needs for technology.

- Seminar in Lafayette for general business community on July 19. A total of 70 people representing 52 different firms in the Acadia area attended.

- As part of the outreach program, NASA technology representatives visited the following industries to talk about technical problems and possible solutions with NASA technology:

o Poly Processing Company	- Monroe
o Cameco Industries, Inc.	- Thibodaux
o Chrisope Technologies	- Sulphur
o Dresser Valves & Controls Division	- Alexandria
o AFCO Industries, Inc.	- Alexandria
o Standard Fittings	- Opelousas
o D. M. I. (Drilling Measurement, Inc.)	- Baldwin
o Alan Tank Company	- New Iberia
o Landcoast Insulating	- New Iberia

- NASA provided technical information support to approximately 40 companies in Louisiana during FY 1991. Representative of the distribution of the inquiries from across the State are:

o DMI Research	- Broussard
o PTI/Encore	- Baton Rouge
o Environmental Soils Analysis	- Morgan City
o Entreprenuerial Development Corporation	- Shreveport

EDUCATIONAL INITIATIVES

NASA provided expert consultation to the Southeastern Louisiana University, Department of Industrial Technology, for the preparation of their proposal to the Board of Regents for a building expansion. Areas of expertise provided were nondestructive examination and metrology.

Nineteen Lunar Sample Education Disk sets were loaned to Louisiana during FY 1991 and viewed by 3,138 students, teachers, and others.

During FY 1991, NASA provided exhibits to the following events (approximately 50,000 attendees) in Louisiana: (1) International Literacy Days (September 17-22, Baton Rouge), (2) USS Kidd Nautical Museum (October 29 - December 7, Baton Rouge), and (3) American Meteorological Society Convention (January 14-17, New Orleans).

EDUCATIONAL INITIATIVES (CONT'D)

The Mobile Teacher Resource Center LASER Van was used at the following places during FY 1991:

April 10 - Slidell High, Slidell	(3 workshops, 30 teachers)
April 11 - Riverdale	(3 workshops, 30 teachers)
April 12 - Kennedy High, New Orleans	(3 workshops, 30 teachers)
September 26-29 - Martin Marietta Michoud	(1 workshop, 120 teachers)

Spacemobile programs, including school visits and teacher workshops, were as follows (total programs/audience):

Special projects	- 17/1,038
Teacher workshops	- 16/132
Elementary programs	- 90/20,658
Junior High programs	- 13/3,171
Senior High programs	- 7/2,955
Classroom visits	- 102/7,811
Television	- 1/336,000

STATE SUPPORT

During FY 1991, NASA has worked closely with the Department of Economic Development to reestablish a State resident office at the Stennis Space Center. NASA will provide furnished office space gratis to assist the State in this important endeavor. Plans are to open the office in FY 1992.

PROCUREMENT AWARDS

During FY 1991, there were approximately 215 contracts awarded from NASA to industry, commercial enterprises, and various Government agencies throughout the State of Louisiana. Obligation funding for these contracts was $398,947,443.

COSMIC ACTIVITIES

NASA's Computer Software Management and Information Center (COSMIC), which is located at the University of Georgia in Athens, has been active with Louisiana companies over the past year. The COSMIC Director, Mr. John Gibson, reports that the following Louisiana firms/agencies have requested and been provided software programs:

- Gulflink Communications - Baton Rouge
- Louisiana State University - Baton Rouge
- Andrew Prinaris - Ruston
- Marine Power, Inc. - Ponchatoula
- Southern University - Baton Rouge
- Textron Marine Systems - New Orleans

REQUESTS TO THE NASA CENTER FOR AEROSPACE INFORMATION (CASI)

During the second year of the Memorandum of Understanding, 154 requests were received from Louisiana companies or universities for NASA Tech Brief Technical Support Packages, and other information involving various technical disciplines from the NASA Center for Aerospace Information (CASI) in Baltimore, Maryland.

SMALL BUSINESS INNOVATION RESEARCH (SBIR) ACTIVITIES

The Small Business Innovation Research (SBIR) manager for MSFC had communications with several small business and 8(a) companies in Louisiana during the past year. This effort enhanced the awarding of one Phase I contract for $50,000 to a Louisiana small business.

PROPOSED ACTIVITIES FOR COMING YEAR

NASA and the State of Louisiana are continuing their joint technology transfer efforts. In addition to applications engineering projects and technical dissemination, NASA will also remain active as bases for seminars, problem discussions, and other outreach efforts. NASA will further encourage that Louisiana industry and economic development personnel visit our various research laboratories to gain a "first hand" look at available technology.

Seminars are currently planned for Shreveport, New Orleans, Baton Rouge, Hammond, and Natchitoches.

National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

NASA

Reply to Attn of **AA00**

JUL 28 1992

The Honorable Kirk Fordice
Governor of Mississippi
New Capitol Building
Jackson, MS 39205

Dear Governor Fordice:

The year 1991 has been very active for technology transfer between the State of Mississippi, the John C. Stennis Space Center and the George C. Marshall Space Flight Center. We are pleased to forward the second report since our December 1989, "Memorandum of Understanding" was signed with the previous administration. Our report covering 1991 and a copy of the original memorandum are enclosed for your review.

Mr. Jimmy Heidel, Executive Director for the Mississippi Department of Economic and Community Development (MDECD), has coordinated the 1991 report with us. Mr. Heidel has pledged to continue and further enhance our approach for implementing technology transfer activities that will meet the needs of Mississippi industry/business. We are certain that Mr. Heidel, his staff at the Mississippi Technology Transfer Office at Stennis, and other divisions within MDECD will continue their efforts with us to make technology transfer a viable method for promoting economic development in Mississippi.

During 1991, we conducted a large number of seminars, speeches and presentations, and processed over 60 inquiries from Mississippi industries, inventors and other private and public sector agencies. Further, over 100 requests were received from Mississippi companies and universities for Tech Brief Support Packages that describe NASA technologies.

We will continue our efforts in 1992 to reach Mississippi businesses and agencies with available NASA technology. We look forward to continuing our partnership in progress and personally wish you every success as you face important challenges as Mississippi's new Governor.

Sincerely,

Roy S. Estess
Director
John C. Stennis Space Center

T. J. Lee
Director
George C. Marshall Space Flight Center

2 Enclosures

FOREWORD

In December, 1989, the Governor of the State of Mississippi and the Directors of the George C. Marshall Space Flight Center (MSFC) and John C. Stennis Space Center (SSC) signed a Memorandum of Understanding calling for the transfer of technology from NASA to the private sector of Mississippi. In the enclosed second annual report, which covers calendar year 1991, we highlight a number of joint Mississippi/NASA technology transfer events, activities, and processes. Most of these were set in motion or facilitated by the groundbreaking 1989 agreement.

C. L. Hill
Acting Chief, Technology Utilization and Applications Division
NASA John C. Stennis Space Center

Ismail Akbay
Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center

Second Joint Report

Memorandum of Understanding Between the State of Mississippi, Stennis Space Center and Marshall Space Flight Center

for

The Governor of Mississippi and the Directors of Stennis Space Center and Marshall Space Flight Center

April 1992

Prepared by
the Chief, Technology Utilization and Applications Division
NASA Stennis Space Center
the Director, Technology Utilization Office
NASA George C. Marshall Space Flight Center and the Director,
Mississippi Department of Economic and Community Development

1-2054-2

THE MEMORANDUM OF UNDERSTANDING BETWEEN THE STATE OF MISSISSIPPI, JOHN C. STENNIS SPACE CENTER AND THE GEORGE C. MARSHALL SPACE FLIGHT CENTER: THE SECOND YEAR

OUTREACH

Technology Utilization personnel representing the Stennis Space Center (SSC), and the Marshall Space Flight Center (MSFC), conducted an aggressive outreach program in Mississippi during 1991. They were supported by Martin Marietta Manned Space Systems and Rockwell Corporation (both under contract to MSFC), Lockheed Engineering Services Company and Sverdrup Technology, Inc. (both under contract to SSC), and DARKAT, Inc., of Gulfport, MS (under contract to SSC).

Martin Marietta is the manufacturer of the Space Shuttle External Fuel Tank at the Michoud facility in New Orleans East, and has an active technology transfer program in both Louisiana and Mississippi. Rockwell International is the manufacturer of the Space Shuttle Orbiter and provides support to MSFC to include the assignment of a Technology Utilization project engineer as a representative to Mississippi on technology transfer matters. Lockheed provides engineering and computer science services in support of the NASA Commercial Use of Space and Technology Utilization Program for commercialization of satellite remote sensing. Sverdrup Technology, Inc. provides engineering and technical services for the SSC Technology Utilization Program. DARKAT is currently managing the Space Technology Small Business Initiative (STSBI), which is based on the NASA Small Business Innovation Research (SBIR) program. DARKAT provides counseling to industry in Mississippi (and surrounding states) to assist in obtaining SBIR grants from NASA.

NASA, working with State and local officials, has now involved 27 counties in developing technology transfer teams. This "county team" outreach program, which began in 1988 with Pike County, is focused on developing leadership at all levels to address economic development, industrial competitiveness, and technology transfer. This county team concept was supplemented in 1991 through the conduct of a number of regional seminars.

The NASA outreach activities conducted in Mississippi were enhanced through the efforts of the personnel at the Mississippi Technology Transfer Center (MTTC) at SSC, who assisted substantially in sponsoring workshops and providing coordination as necessary on other technology transfer matters. NASA outreach efforts include:

NASA Workshops (1991):

- February 7-8 - Exhibited NASA technology at the Gulf Coast Business EXPO at the Gulf Coast Coliseum.

- March 8 - Participated in small business and technology transfer seminar at Mississippi State University with 40 attendees from industry, economic development agencies and small business development. The seminar was presented by DARKAT, Inc., and sponsored by the Mississippi State Small Business Development Center and the Oktibbeha County Development Council.

OUTREACH (CONT'D)

- o March 22 - Presented technology transfer seminar at SSC for the Existing Industry Manager and six regional office managers at the Mississippi Department of Economic and Community Development (MDECD).

- o April 11-12 - Exhibited NASA technology at EXPO 91 in Jackson which was a way to reach businesses not normally considered as candidates for technology transfer programs.

- o May 8 - Presented seminar at the Gulf Coast Business Technology Center in Biloxi for "new start" industrialists. The technology center is an incubator facility that was completed in early 1991.

- o August 29 - Hosted Small Business Fair on the Gulf Coast which was sponsored by Congressman Gene Taylor. The Fair's purpose was to familiarize businesses with the various projects being conducted at SSC.

- o September 18 - Conducted the East Central Mississippi Technology Conference in Meridian for approximately 80 industry representatives. NASA engineers gave presentations on technologies such as composite materials and printed circuit boards. Stennis Center Director Roy Estess addressed the group, as did Congressman G. V. (Sonny) Montgomery. Conference sponsors were economic development organizations from Lauderdale, Kemper, Neshoba, and Wayne counties; the Meridian Small Business Development Center; Mid-Mississippi Development district; and the Mississippi Power Company.

- o October 7 - Conducted technology transfer and Total Quality Management seminar for the William Carey College MBA Leadership Forum. Twenty-five students attended the seminar as part of their continuing adult education course work.

- o October 11-12 - Participated in the National Innovation workshop in Jackson sponsored by the Department of Energy and the National Institute of Standards and Technology. The purpose of this initiative by Congressman Mike Parker was to introduce entrepreneurs to the steps in commercializing an invention, obtaining financing, and locating sources of assistance. Mr. James Rose, NASA's Assistant Administrator for Commercial Programs, was the opening keynote speaker. Other NASA work session speakers addressed Small Business Innovation Research (SBIR) opportunities and Technology Utilization Program assistance.

In addition, DARKAT, our Small Business Innovation Research (SBIR) outreach arm, conducted a number of seminars and planning sessions for business and economic development representatives. DARKAT also attended several trade shows and addressed professional/civic organizations to publicize small business opportunities available from NASA and the federal sector.

VISITS TO MISSISSIPPI INDUSTRY

During 1991, a number of visits were made to Mississippi companies who had indicated an interest in accessing NASA technology. They are as follows:

- o January 1991 - Tab Industries (Sand Blasting) in Pascagoula
- o May 1991 - Bell Avon (Composite Materials and Rubber Products) in Picayune
- o June 1991 - Hercules, Inc., (Modified Rosins and Resins) in Hattiesburg
- o September 1991 - Peavey Electronics (Amplifiers and other sound equipment) in Meridian
- o September 1991 - Structural Steel (Steel Fabrication) in Meridian
- o September 1991 - Miner Edger Works (Circular Saws) in Meridian
- o September 1991 - Southern Cast (Steel Castings) in Meridian

MISSISSIPPI INQUIRIES ADDRESSED TO NASA

Resulting from our various outreach efforts, there were over 60 technical inquiries received by NASA from Mississippi companies. The inquiries covered topics as diverse as new electronic technology, life sciences, composites, and fabrics. These inquiries were responded to with assistance from several NASA Field Centers, other federal agency laboratories from around the nation, and our NASA contractors.

SMALL BUSINESS INNOVATION RESEARCH (SBIR) AWARDS

NASA, through its subcontractor, DARKAT, Inc., is in the third year of a planned three-year pilot project to develop methods for improving commercial outcomes of SBIR projects. The Space Technology Small Business Initiative is an integral part of building a strong and active SBIR program in a three-state region of which Mississippi is a participant. Resulting from this focused effort by NASA, three Mississippi businesses were presented Phase I awards (approximately $50,000 each). These companies were:

- Delta Data Systems, Picayune
- Integrated Technologies, Bay St. Louis
- Hilton Systems, Jackson

NASA SPEAKERS BUREAU

A key point of NASA's public affairs program is to furnish volunteer speakers to tell the "NASA story". During 1991, a total of twenty-eight different audiences representing 1,660 individuals were addressed. The audiences included religious organizations, educational institutions, and a variety of civic organizations. The following communities were visited:

Bay St. Louis	Tylertown
Gulfport	Biloxi
Orange Grove	Bay Springs
Edgewater	Pass Christian
Hattiesburg	Columbus
Perkinston	Long Beach
Jackson	Kossuth

EDUCATIONAL INITIATIVES

Tri-State Educational Initiative: The NASA/SSC sponsored Tri-State Education Initiative completed its first year on December 4, 1991. Serving a 50-mile radius area in Northeast Mississippi, Northwest Alabama, and South Central Tennessee, the initiative's mission is to "...promote and support the efforts of communities in developing a quality education system that will permit their citizens to obtain the necessary skills for gainful employment--into the 21st century--in America's high technology economy." During the year, several activities were accomplished. They are as follows:

- Organize 29 school districts into a consortium
- Hire an onsite program manager (Dr. David Powe)
- Establish federal/state/local/private sector support
- The innovative Tri-State Learning Center neared completion

This effort is fully supportive of the National Educational Goals and the President's AMERICA 2000 strategy, but more importantly, this effort is positioned to deliver educational improvements that are needed and wanted by the communities. This initiative also stands as an adaptable model of government/private sector cooperation to initiate a systemic change in American public education.

The Laser Project: Learning About Science, Engineering and Research (LASER) is a major effort which is being piloted within the school systems surrounding the MSFC in Huntsville. The program includes lectures, demonstrations, exhibits, and laboratory "hands-on" experiences using active and retired NASA scientists and engineers. A software system, which can be copied and provided to other users, has been developed to catalog the data about volunteers and their capabilities. As part of the LASER project, an industry-provided LASER van for use as a mobile NASA Teacher Resource Center has been outfitted and is being used at present. The van was in place from November 8-11 in Booneville (Prentiss County) and in Tishomingo County.

EDUCATIONAL INITIATIVES (CONT'D)

Additionally, an on-site laboratory at the MSFC has been established which can accommodate 25-30 teachers or students for demonstrations of educational activities in physics, chemistry, and other sciences. This laboratory is available to meet the needs of Mississippi and the other states surrounding the MSFC.

Visitors Center and Teacher Resource Center: In 1991, more than 30,000 students visited the Stennis Space Center. The Teacher Resource Center (TRC) hosted 15 workshops attended by 2,181 teachers. The TRC also duplicated over 600 software packages and 770 audio/video tapes for Mississippi teachers.

BOARD/COMMITTEE MEMBERSHIP BY NASA PERSONNEL

- Mississippi Academy of Science
  Chairman - Government Relations Committee

- Mississippi Mineral Research Institute
  Member - Advisory Council

- NIST Grant "Planning the Mississippi Technology Extension Service"
  Member - Planning Group

SPECIAL PROJECTS

NASA assisted the Mississippi Research Consortium and Mississippi Technology Transfer Office in hosting the site visiting team from Cal Tech to discuss the SSC as a location for the Laser Interferometer Gravitational Wave Observatory. NASA participation included collecting background information about the SSC ranging from traffic patterns to wetland identification based on thematic overlays from satellite data and remediation considerations.

NASA is also assisting the Mississippi Research Consortium and the Mississippi Department of Economic and Community Development in their efforts to develop a Management Operating Plan for vitalizing the Mississippi Technology Transfer Center located at the SSC.

COMMUNITY COLLEGE GEOGRAPHICAL INFORMATION SYSTEM (GIS) INITIATIVE

During 1991, NASA and the Pearl River Community College (PRCC), embarked on a joint project with the following objectives:

- Develop GIS core capability at PRCC
- Use PRCC to create awareness of GIS potential value to industry
- Develop a workable technology transfer model for other technologies
- enhance the PRCC Geography curriculum

Dr. Olon Ray, Executive Director of the State Board for Community and Junior Colleges, is aware of the project and is interested in expanding the relationship to the remainder of the community colleges.

PROCUREMENT AWARDS

During 1991, there were 58 minor contracts and purchase orders awarded from SSC/MSFC to industry, commercial enterprises and various governmental agencies throughout the State of Mississippi. A total value of these contracts was $5,575,222. This figure does not include the major contract from MSFC to Lockheed Missiles and Space Systems Division for the Advanced Solid Rocket Motor (ASRM) project at Yellow Creek in Tishomingo County or the technical services contract at the SSC.

COSMIC ACTIVITIES

NASA'S Computer Software Management and Information Center (COSMIC), located at the University of Georgia in Athens, has been active with Mississippi companies over the past year. The COSMIC Director, Mr. John Gibson, reports that nine Mississippi firms/agencies have been served including large industries such as Ingalls in Pascagoula, and Aerojet in Iuka; the University of Mississippi, Jackson State University, and Mississippi State University.

REQUESTS TO THE NASA CENTER FOR AEROSPACE INFORMATION (CASI)

During the second year of the Memorandum of Understanding, over 100 requests were received from Mississippi companies or universities for NASA Tech Briefs technical support packages, and other information involving various technical disciplines from the NASA Center for AeroSpace Information in Baltimore, Maryland.

ACTIVITIES/PROJECTED ACTIVITIES FOR 1992

NASA and the State of Mississippi are continuing their joint technology transfer efforts. In addition to technical dissemination, our Centers will remain active as a base for seminars, problem discussions, and other outreach efforts. We will further encourage that Mississippi industry, economic development agencies, and education personnel to visit our various research laboratories to gain a "first-hand" look at available technologies.

Our Speakers Bureau activities will continue, as will the various educational initiatives throughout the State. As activities increase at the NASA Yellow Creek Facility in Tishomingo County, we plan an enhanced level of educational information and technology transfer outreach in Mississippi's northeast quadrant.

In 1992, several small business and technology transfer seminars have been and will be presented. We plan to continue our visits to industry and are confident that 1992 will be even more productive than the very successful years that we enjoyed in 1990 and 1991.

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE STATE OF MISSISSIPPI,
THE JOHN C. STENNIS SPACE CENTER, AND
THE MARSHALL SPACE FLIGHT CENTER
FOR
THE TRANSFER OF NASA-DERIVED TECHNOLOGY
TO THE PRIVATE SECTOR
IN MISSISSIPPI

Whereas, the National Aeronautics and Space Administration (NASA), by virtue of the National Aeronautics and Space Act of 1958, is directed to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof. Recent legislation and executive orders have further directed federal agencies to heighten their efforts to move innovative technologies into the U.S. private sector. NASA has mandated its ten Field Centers to carry out technology transfer activities through national, regional, state and local outreach programs; and,

Whereas, the John C. Stennis Space Center and the George C. Marshall Space Flight Center, having close geographical proximity to the State of Mississippi, actively support inter-center programs to make available their technologies to Mississippi industry and to link users with NASA technologies resulting from research and development performed at other NASA Centers; and,

Whereas, the U.S. has long dominated world technology but in recent years has been strongly challenged by foreign nations, who have invested in years of intense research and development to upgrade their own technological capabilities. However our response, if we are to maintain competitiveness, must be to continue development and application of advanced technology to create superior products and services for the world market. NASA research programs, therefore, are doubly important. First, they represent a leading source of new technology, because aerospace programs are, by their challenging nature, extraordinarily demanding of technological input and the innovations they generate are exceptionally diverse. Because it is readily transferable, the technology being developed today provides a wellspring of know-how for new applications tomorrow. Secondly, NASA programs of the past three decades have created a vast storehouse of already-developed technology that is available now for use by industry in creating new products and processes. It is a natural resource that can be put to work to enhance national productivity and competitiveness. Its importance is underlined by the fact that more than 30,000 secondary applications of this technology -- spinoffs -- have emerged to the benefit of the nation's lifestyle and economy; and,

Whereas, the State of Mississippi acknowledges that the transfer of NASA-derived technology to the private sector provides for more employment opportunities for the citizens of Mississippi, makes businesses and companies more competitive, and improves the economy of the state; and,

Whereas, the people of Mississippi, in recognition of these possibilities have donated to NASA the Mississippi Technology Transfer building at the John C. Stennis Space Center and created the Mississippi Technology Transfer Center to enhance technology transfer opportunities and to engage in the development of joint projects with industry, state and local governments;

Now, therefore, in consideration of the mutual understandings set forth herein and the benefits accruing therefrom to each party to this Agreement, NASA/John C. Stennis Space Center, NASA/George C. Marshall Space Flight Center, and the State of Mississippi do hereby agree effective December 8, 1989, as follows:

ARTICLE I - PURPOSE AND SCOPE

1.0 The State of Mississippi, the John C. Stennis Space Center (hereafter referred to as SSC), and the George C. Marshall Space Flight Center (hereafter referred to as MSFC) will actively cooperate together in providing NASA-derived technology to the private and public sectors of Mississippi.

1.1 It is recognized that NASA SSC's and MSFC's ability to perform obligations is subject to the availability of appropriated funds. All work done by either party related to this agreement is at the sole discretion and the expense of that party. There will be no direct exchange of funds resulting from this agreement.

1.2 This agreement is supplementary to other existing agreements and is not intended to supercede agreements already in place between any of the participants.

ARTICLE II - DESIGNATION OF CONTACTS

2.0 Each party will designate an organization to serve as an official contact and to coordinate the activities of each party in carrying out this agreement. Appendix I lists the initial appointees of each party.

2.1 The State of Mississippi hereby designates the Mississippi Technology Transfer Office, within the Mississippi Department of Economic Development, as its official contact to coordinate the activities of the State in carrying out this Agreement. The State will staff, operate, support and utilize the Mississippi Technology Transfer Office (MTTO) within the Mississippi Technology Transfer Center located at SSC as the state's formal avenue for communication with the SSC and MSFC.

2.2 SSC and MSFC agree to participate with the Mississippi Technology Transfer Office in the carrying out this agreement, and will coordinate activities through the contact designated by the State of Mississippi, Office of the Governor.

2.2.1 The Director of SSC hereby designates the SSC Technology Utilization Officer to serve as the SSC official contact.

2.2.2 The Director of MSFC hereby designates the MSFC Technology Utilization Officer to serve as the MSFC official contact.

ARTICLE III - RESPONSIBILITIES

3.1 SSC and MSFC will provide NASA technology transfer information and literature to those State organizations supporting Mississippi businesses and companies.

3.2 SSC and MSFC will identify to the state official contact NASA-derived technology that may be beneficial to the Mississippi private sector.

3.3 Each party will support workshops and symposiums as mutually agreed to that are beneficial in providing NASA-derived technology to the private sector in Mississippi.

3.4 Each party will cooperate with the others in transferring NASA-derived technology to the private sector. This will include the establishment of specific working relationships and programs between SSC, MSFC, and State officials and institutions to best achieve technology-transfer.

3.5 The appointed administrative officials serving as points-of-contact under this understanding, will prepare yearly, a joint report summarizing the activities and achievements made under this understanding. Copies of the yearly report may be distributed to appropriate NASA and State officials and to the State Legislature.

ARTICLE IV - TERM OF UNDERSTANDING

4.0 The term of this memorandum of understanding is for an indefinite period. However, it shall be reviewed at least every two years to ensure that it is still fulfilling its purposes and to make any necessary revisions.

4.1 Any party may terminate this understanding by providing a written notice to the other parties.

In witness whereof, the parties have executed this memorandum of understanding.

Ray Mabus, Governor
State of Mississippi

Date: _____

Roy S. Estess, Director
John C. Stennis Space Center

Date: 12/8/89

T. J. Lee, Director
George C. Marshall Space Flight Center

Date: 12/8/89

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
STATE OF MISSISSIPPI AND JOHN C. STENNIS SPACE CENTER
AND THE MARSHALL SPACE FLIGHT CENTER

APPENDIX I - APPOINTEES

State of Mississippi	Clayton D. Griffith Assistant Director Mississippi Technology Transfer Office Mississippi Department of Economic Development Building 1103, Mississippi Technology Transfer Center Stennis Space Center, MS 39529 PHONE: 601-688-3144
National Aeronautics and Space Administration	
John C. Stennis Space Center	Mr. Robert M. Barlow Technology Utilization Officer John C. Stennis Space Center Code HA00 Stennis Space Center, MS 39529 PHONE: 601-688-1929
George C. Marshall Space Flight Center	Mr. Ismail Akbay Technology Utilization Officer George C. Marshall Space Flight Center Code AT01 Marshall Space Flight Center, AL 35812 PHONE: 205-544-2223

LETTERS OF APPRECIATION

PPG Industries, Inc.
Post Office Box 2200 Huntsville, Alabama 35804 USA Telephone: (205) 859-2500

Mr. Roger Black
AT01
George C. Marshall Space Flight Center
Huntsville, AL 35812

Dear Mr. Black

I would like to take the opportunity to thank NASA (especially Mr. Bill Nerren and you) for the extraordinary assistance provided concerning our bond line adhesion problem (NASA problem statement #376).

During the three months that NASA worked on this problem, considerable effort was expended by Mr. Nerren, his staff, and various contractors analyzing several samples for surface contaminants. Among the techniques employed were FTIR (NVR and microscopic analysis), X-ray Fluorescence, and ESCA. Results from these analysis might suggest silicone contamination deposited on our substrate during ITO film deposition and(or) organic contamination of the test substrate due to a release material used in sample preparation. We are currently investigating these findings experimentally and hope to finalize our confirmation studies within the next month. Once this is complete, I will inform Mr. Nerren of our results.

In addition to the analytical work, NASA helped us in several other ways. These include: receiving a great deal of insight concerning substrate cleaning, learning methods to measure and quantify surface cleanliness, learning methods to prepare and package samples for surface analysis, and learning general methodology for investigating surface contaminant problems. Also, Mr. Nerren's two plant visits turned up several "areas of improvement" which we are currently addressing in an effort to improve our processes.

Again, I would like to thank NASA for assisting us in this bondline adhesion problem. If there is any reasonable way in which I can help you in the future, please do not hesitate to contact me.

Scott Fischer

Scott Fischer

Alabama Department of Economic And Community Affairs

GUY HUNT
GOVERNOR

GENE ANDERSON
DIRECTOR

February 26, 1992

Mr. Roger Black
NASA Technology Utilization Office
AT01
Marshall Space Flight Center, Alabama 35812

Dear Roger:

Thank you for agreeing to attend the signing ceremony with Governor Hunt for proclaiming National Science and Technology Week (NSTW).

We will assemble at 8:45 a.m. Tuesday, March 3, in the lobby area of the main entrance to the State House, 11 South Union Street, directly behind the Capitol. Please check in at the desk in the State House lobby when you arrive since there will be other groups here for other occasions. Please mention Donna Robinson and NSTW when checking in.

There will be a number of proclamations being signed that day so the audience with the Governor will be short. Parking is on your own unless you would like to park in our parking deck at 401 Adams Avenue. The parking code is *357#. It is a four-block walk from our deck to the State House.

We look forward to seeing you there.

Sincerely,

Russell Moore

Russell Moore
Staff Engineer

RM:BJP

401 Adams Avenue • P.O. Box 5690 • Montgomery, Alabama 36103-5690 • (205) 242-5100

STATE OF GEORGIA

OFFICE OF THE GOVERNOR

ATLANTA 30334-0900

Zell Miller
GOVERNOR

January 17, 1992

Mr. T. J. Lee
Director
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Dear Mr. Lee:

Thank you for keeping me informed of the joint activities that have been conducted between the State of Georgia and the Marshall Space Flight Center (MSFC).

I appreciate the great effort your center makes in conjunction with Georgia Tech to provide technical assistance to Georgia businesses. Your visits to 13 Georgia businesses over the past year and the subsequent assistance provided by MSFC and Georgia Tech have had a positive impact on industries throughout Georgia. Additionally, the educational initiatives, such as the Mobile Teacher Resource Center and speeches by many noted members of the MSFC staff, have been very helpful both in educating us about NASA and encouraging our children to become more interested in pursuing a career in science.

I look forward to our continued partnership in technology transfer and other related areas.

With kindest regards, I remain

Sincerely,

Zell Miller

ZM:lld

Alabama Department of Economic And Community Affairs

GUY HUNT
GOVERNOR

GENE ANDERSON
DIRECTOR

August 26, 1992

Mr. Ismail Akbay
Director
Technology Utilization Office
NASA
George C. Marshall Space Flight Center
Huntsville, Alabama 35812

Dear Ish:

I want to sincerely thank you and all of the members of the NASA team for coming to Randolph and Dale Counties during our countywide technology transfer initiative to manufacturers. I sincerely believe that we are only on the threshold of realizing the benefits to transfer space age technology to our manufacturing firms in Alabama. This, of course, developed after the Memo of Understanding was signed by Governor Hunt and the director of Marshall Space Flight Center in 1989.

I would like for you to consider writing every economic developer throughout the state and encourage them to take full advantage of our joint venture program within their community. I think we have learned some things in Randolph and Dale Counties. Your letter will be well received by the economic developers as they are grappling for ways to make our companies more competitive on a global basis. Having access to your 2300 engineers enables our companies to reach into the repository of unlimited technologies, which enhances their processes, product line efficiencies, and profits.

I look forward to receiving a copy of your letter and for us moving on and taking this program statewide.

With kindest personal regards, I remain

Respectfully,

John W. Giles
Chief
Existing Business and Industry Service

401 Adams Avenue • Suite 580 • P.O. Box 5690 • Montgomery, Alabama 36103-5690 • (205) 242-5100

Alabama Department of Economic And Community Affairs

GUY HUNT
GOVERNOR

GENE ANDERSON
DIRECTOR

September 21, 1992

Mr. Ron Van Zant
Chairman, Existing Business
Greater Valley Area Chamber
of Commerce
P. O. Box 205
Lanett, Alabama 36863

Dear Ron:

I appreciate the opportunity to meet with you and the Existing Business Committee of the Valley Area Chamber of Commerce last week and to present our cooperative technology assistance program with NASA. We are looking forward to initiating this program in Chambers County.

I have spoken to our point of contact at NASA, Mr. Roger Black, 544-5820, with the Marshall Space Flight Center Technology Utilization Office in Huntsville. He and the director of the Technology Utilization Office, Mr. Ismail Akbay, are enthusiastic about bringing this program to Chambers County. This will be the third county in Alabama following Randolph and Dale.

We are now looking at a date in November to kickoff the program. The kickoff will entail the orientation and training of local volunteers beginning at approximately 10:00 a.m. This will be followed by a luncheon for the volunteers and the plant managers from around the county plus the local press. At the luncheon, the plant managers will be presented the benefits of participating in this program for their business.

Following the luncheon, we will split into teams and escort the volunteers to tour a few sample industries. This educates the volunteers in techniques of finding potential problem statements.

401 Adams Avenue • Suite 580 • P.O. Box 5690 • Montgomery, Alabama 36103-5690 • (205) 242-5100

First of all, we need a list of industries in your county. You will also want to begin putting together a list of about 20 volunteers. Be sure to include some from the LaFayette area.

As soon as we have a target date, I will call you. I look forward to working with you in this endeavor.

Sincerely,

Russell Moore
Aerospace Program

cc: John Giles
Ismail Akbay

NATIONAL
ECHNOLOGY TRANSFER
CENTER
• • •

VHEELING *JESUIT* COLLEGE

April 2, 1992

Mr. Ismail Akbay
George C. Marshall Space Flight Center
Technology Utilization Office
Code AT01
Marshall Space Flight Center, AL 35812

Dear Mr. Akbay,

On behalf of the National Technology Transfer Center, I would like to take this opportunity to thank the staff and technicians of George C. Marshall Space Flight Center who worked on the *UV resistant ink and dye technical request*, and you personally for the taking the time out of your busy schedule to provide us with a solution. Please extend our sincere appreciation to Ms. Wanda Randolph for her outstanding support. The number of technical requests we receive clearly proves that there is a great need, in industry, for such technology transfer. However, those needs cannot be met without your help; on our part we try our best to integrate the information you provide.

Our clients have told us how grateful they are for such help, and how useful it was for them. We hope that we will be able to work on more of these requests in the future to put **Federal Laboratory Technologies to work for industry**.

Thank you once again for your support and cooperation.

Sincere regards,

Sujoy K. Basu.

Three Hundred Sixteen
Washington Avenue
Wheeling, West Virginia
2 6 0 0 3
•
(304) 243-2455
•
F A X
(304) 243-2457

A Bell Atlantic Company
C&P Telephone

The Chesapeake and Potomac
Telephone Company of West Virginia
1500 MacCorkle Avenue, S.E.
Charleston, WV 25314
304 344-7788

Walter Lapinsky, Jr.
Manager-Business Development

February 14, 1992

Mr. Ismail Akbay, Director
Technology Utilization Office
Marshall Space Flight Center (AT-01)
Huntsville, Alabama 35812

Dear Ismail,

I want to thank you for being the keynote speaker for the Martinsburg Rotary meeting. Your talk was educational and informative. NASA's technology utilization program is an excellent use of taxpayers dollars and I will encourage all West Virginian's to take advantage of it when applicable.

Also, Wanda Randolph has made unbelievable progress at networking with state government and the people of West Virginia. She represents the TU office and NASA very well and I've received nothing but praise for her professionalism and the work that she is doing to help our business community. Until her assignment, we were not aware of the Technology Utilization program. Please relay our sincere appreciation to her.

In closing, we in West Virginia look forward to a long working relationship with you and Wanda and I offer my assistance as needed.

Sincerely,

Walt